

An ESP Course to the Students of Marine Sciences

Unit 3: The Deep Ocean

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Key Vocabulary

dive

frontier

explore

ridges

crust

mystery

Tectonic plates

trench

cross section

sediment

rot

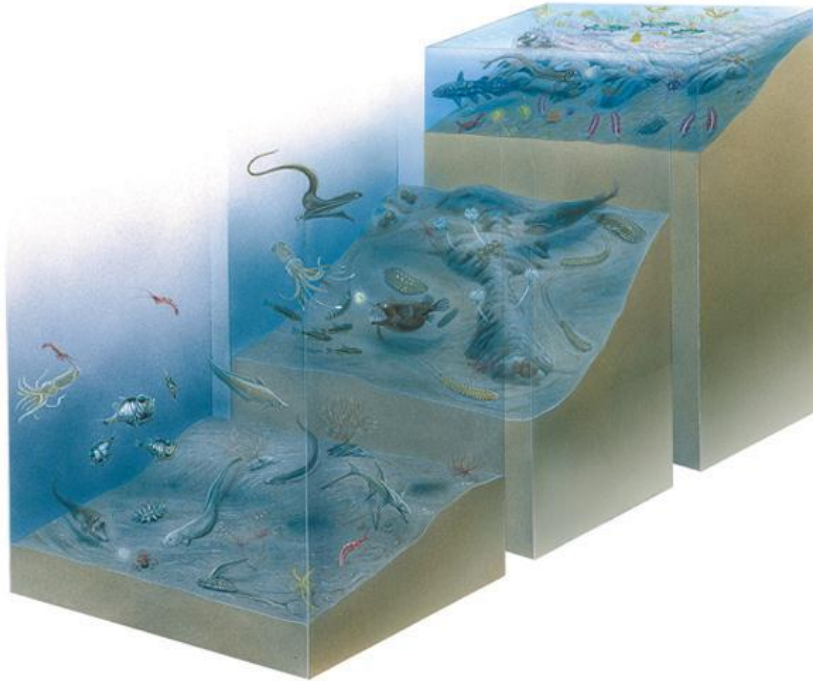
slop

fossil

harden

Brainstorming: group work

This is a cross-section diagram of the planet Earth. Do you see the layers beyond the surface? Do you know what they are called?

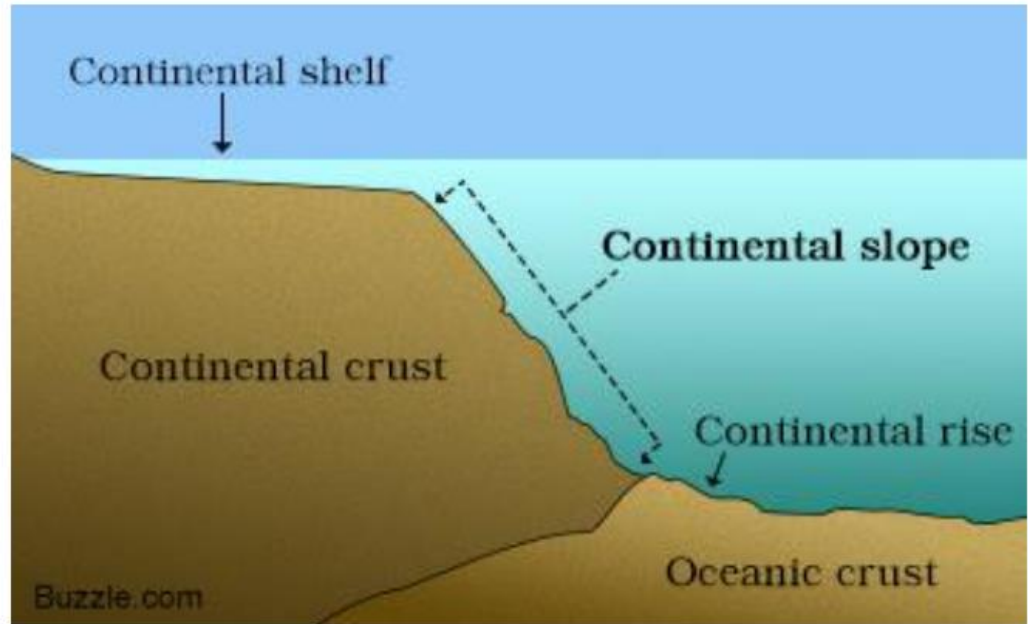


3.1. The Ocean Frontier

Humans have used boats to explore the surface of the oceans for thousands of years, and diving equipment has allowed us to explore shallower waters. The true final ocean frontier is the deep ocean. It holds many mysteries that scientists and explorers are still trying to uncover

3.2. Crust and Ocean Floor

Earth's surface is made up of hard, rocky **crust** floating on a layer of fluid rock, called **magma**. There are two kinds of crust: **continental crust** and **oceanic crust**. Oceanic crust is made of denser, heavier rocks, so it sinks lower into the magma. Earth's water flows down into these lower areas, forming the seas and oceans.



➤ **3. a. Checkpoint: Work in pairs to discuss the above information, then complete the following:**

1. Boats are used to investigate the _____
2. The ocean final frontier is _____.
3. _____ is a hot liquid rock below the surface of the earth.
4. The two crusts of Earth are _____ and _____.
5. The rocks of the oceanic crust are _____ than the continental crust's rocks.

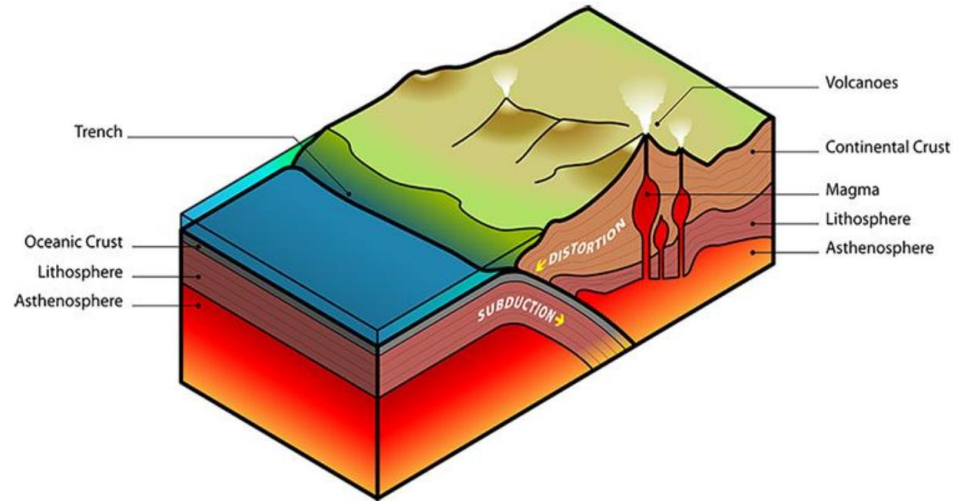
➤ **3. b. Pair Work: Complete the following with the suitable words from brackets after making necessary changes:**

(explore, continent, hold, rock, ocean, dive)

1. Different diving equipment are used by _____ under the oceans.
2. Ocean _____ spend years in uncovering the deep mysteries.
3. The deep ocean _____ many secrets.
4. The Earth's crust is _____.
5. The rocks of the _____ crust are lighter than the rocks of the _____ crust.

3.3. Tectonic Plates

Earth's crust is made up of huge sections called **tectonic plates**, which fit together like jigsaw puzzle pieces. They **gradually** move, causing the continents and oceans to change shape over time. Like the land, the ocean floor has many geographical features, especially at places where two plates meet. Long, high oceanic **ridges** form where two plates are being pushed apart by new magma from inside Earth.



In other places, one plate pushes beneath another, forming a deep **trench**. There are also underwater mountains, volcanoes, **valleys**, and plains.

➤ **3. C. Group Work: Discuss the above paragraph and complete the following:**

1. _____ are great parts of Earth's crust.
2. The shape of the continents and oceans is changed due to the movement of the _____.
3. When two plates are pushed apart by a new magma, _____ are formed.
4. A _____ is formed when two plates are pushed under one another.
5. _____, _____, and _____ are geographical characteristics of oceans.

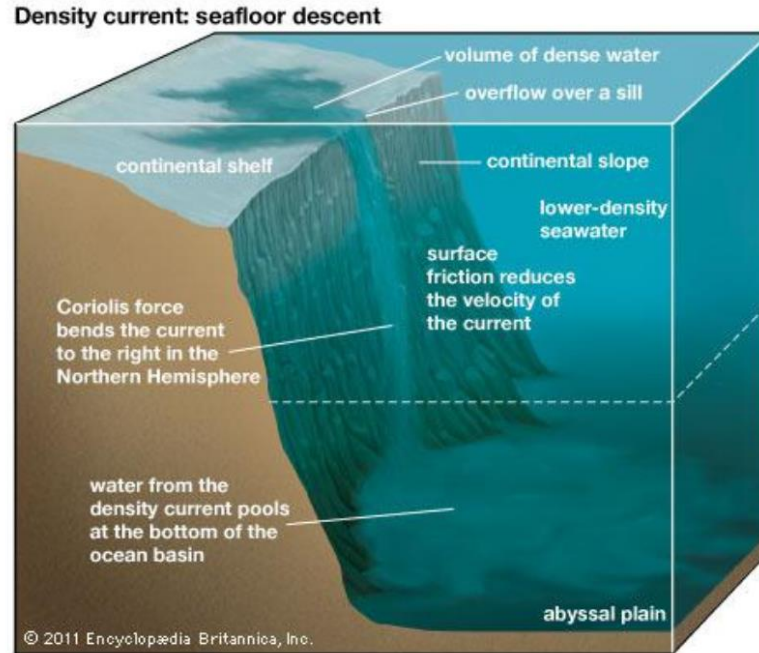
➤ 3. D. Work in pairs to make the suitable choice:

1. The ocean floor _____ many geographical features. (has, have, having)
2. Ridges _____ when two plates are being pushed a part by a new magma. (forms, form, formation)
3. A deep trench is formed when two plates _____ beneath another. (push, pushes, pushing)
4. Most seas and oceans _____ similar shape in cross- section. (has, have, having)
5. The _____ of the tectonic plates change the shape of oceans. (moves, move, movement)

3.4. The Shape of the Ocean

Most seas and oceans have a similar shape in **cross-section**. Next to the land, the ocean floor is smooth and **slopes** gently downward. This is the **continental shelf**, and it can range from just a few miles to hundreds of miles wide. The water here is usually less than 150 m deep.

At the **continental slope**, the ocean floor angles much more steeply downward. Then, the slope becomes gentler again, forming the **continental rise**. This leads to the **abyssal plain**, the deep, flat ocean floor, which is around 2,000- 5,000 m deep.



➤ **3. C. Fill the following brackets from the information you learnt the above paragraph.**

1. _____ is the meeting area between the land and the ocean floor.
2. The continent slope is the meeting area between the _____ and the _____.
3. The depth of water in the _____ is 150 m.
4. The ocean floor in the _____ is deep and flat.
5. The depth of the abyssal plain is _____.

3.5. How Fossils Form

Fossils form most easily in the seas and oceans because of the layers of **sediment** (mud, sand, and silt) that quickly collect on the ocean floor, covering up the **remains** of dead animals. Because of this, the most common fossils are of marine animals, such as fish and ammonites. This step- by- step sequence describes how fossils form:

1. A dead animal falls to the ocean floor.
2. Its soft parts **rot**, leaving the skeleton or shell.
3. Layers of sediments settle on top. Over time, they are crushed down and **harden** into rocks.
4. The hard parts of the animal gradually dissolve, leaving a hollow mold.
5. Mineral-rich seawater fills up the space, and minerals in the water collect there, making a stone cast: a fossil.

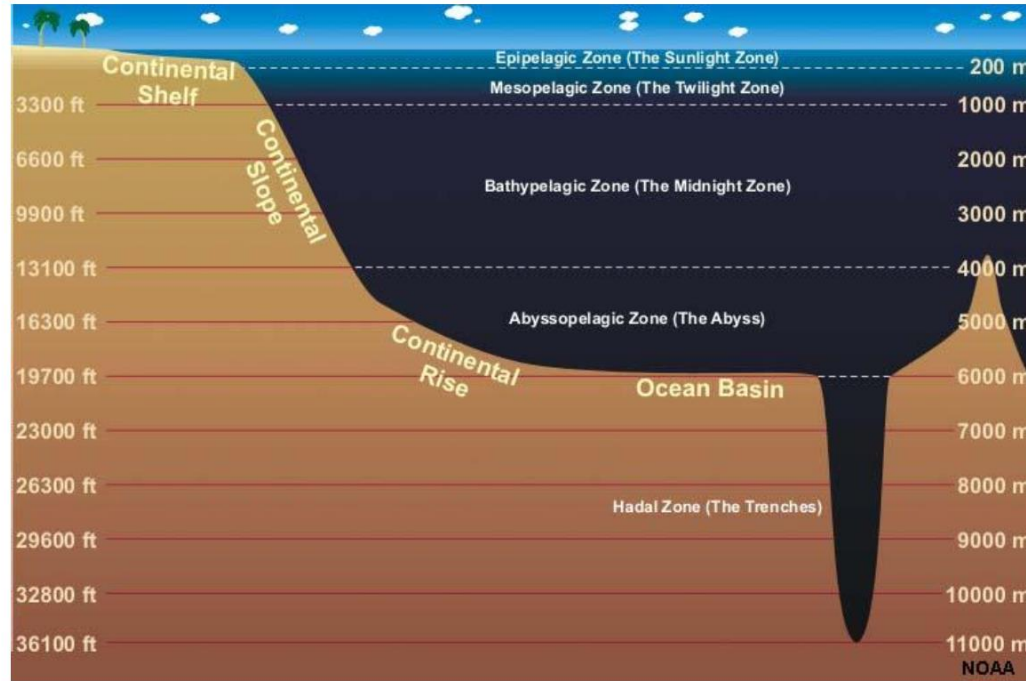


➤ **3. D. Group work: Read the following sentences. Check if they are true or false, and if they are grammatically correct, then make the necessary corrections.**

1. Dead animals falls to the ocean surface.
2. The hard parts of the dead animals rot.
3. Mud, sand and silt covers the dead animals.
4. The soft part of the dead animals dissolve.
5. Freshwater fills the space inside the dead animal and make fossils.

3.6. The Ocean Zones

There are several zones in the oceans. The top 200 m is called the **sunlit zone** because sunlight can **penetrate** the water. The **twilight zone** is between 200 to 1,000 m deep and receives very little sunlight.



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The next three zones receive no sunlight at all. They are the **midnight zone**, the **abyssal zone**, and the **hadal zone**.

➤ **3. E. Group Work: Complete the following to make from suitable words in brackets.**

1. The sunlight _____ the ocean water in the sunlit zone. (penetrate, penetrates, penetrated)
2. The twilight zone _____ very little sunlight. (get, gets, getting)
3. The midnight zone, the abyssal zone, and the hadal zone _____ no sunlight at all. (receive, receives, receiving)
4. The ocean zones which are not reached by light are very _____. (dark, light, clear)
5. The ocean zones which are reached by light are _____. (sunlit and twilight zones, abyssal and hadal zones)

3.7. Understanding the ocean Floor

Some scientists explore the deep to study the features of the ocean floor, such as trenches, ridges, and **hydrothermal vents**, where hot water seeps out from inside Earth.

These geological features can provide clues about how Earth formed and how tectonic plates work. In addition to increasing our knowledge, this can help with practical problems such as predicting earthquakes.

Vocabulary focus

explore : uncover : investigate

frontier : border

mysteries : secrets

gradually : step by step

features : characteristics

beneath : under

smooth : flat

steeply : sharply

penetrate : go through

➤ **3. F. Pair Work: List the following features into list A or B:**

(trench, volcano, rocks, mountain, ridge, tectonic plate, river, crust, slop, fossil)

a. Geographical feature	b. Geological features

**WRITING
BOX**

Write a short paragraph about fossils. Answer questions like; What are they? How do they form?

Glossary

frontier/'frʌn.tiər/ a line or border separating two countries.

explore/ɪk'splɔːr/ to search and discover (about something)

diving/'daɪ.vɪŋ/ swimming underwater

mystery/'mɪs.tər.i/ something strange or not known that has not yet been explained or understood

crust/krʌst/ a hard outer covering of something

magma/'mæɡ.mə/ hot liquid rock found just below the surface of the earth

tectonic plates/tek'tɒn.ɪk 'pleɪt/ one of the parts of the earth's surface that move in relation to each other

ridge/rɪdʒ/ a long, narrow raised part of a surface, especially a high edge along a mountain

trench/trentʃ/ a narrow hole that is dug into the ground

cross-section/'krɒs.sek.ʃən/ something that has been cut in half so that you can see the inside

slop/slɔːp/ to cause a liquid to flow over the edge of a container making a rough movement

fossils/'fɒs.əl/ the shape of a bone, a shell, or a plant or animal that has been preserved in rock for a very long period

sediment/'sed.ɪ.mənt/ a soft substance that is like a wet powder and consists of very small pieces of a solid material that have fallen to the bottom of a liquid

rot/rɒt/ to (cause something to) decay

harden/'hɑː.dən/ to become or make hard

