

Earth and Space Science	Lesson
Earth's History	
<p>The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.</p>	38
<p>Fossils provide important evidence of how life and environmental conditions have changed.</p>	38
Earth in the Solar System	
<p>The earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.</p>	45
<p>Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.</p>	42
<p>Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides.</p>	42
<p>The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.</p>	44

40—Ocean Exploration

A ¹If you were able to view Earth from space, you would see that about 70% of it is covered by water. ²To date, human eyes have viewed only about 1% of these vast ocean waters. ³People have been trying to explore the oceans for thousands of years. ⁴Underwater exploration is not only very difficult, but it is very dangerous as well. ⁵The oceans are extremely large bodies of water that are very dark, deep, and exceptionally cold. ⁶Another factor that contributes to the difficulty of exploration is that underwater pressure can exceed more than 16,000 pounds per square inch. ⁷That's more pressure than you would experience if an adult elephant stood on you!

B ⁸Nearly all underwater discoveries depend on **submersibles**, such as remotely operated vehicles (ROVs) and automatic underwater vehicles (AUVs). ⁹Scientists also use side-scan **sonar** devices attached to ships at the ocean's surface to create maps of the seafloor.

C ¹⁰Even with these tools, it is still difficult for **oceanographers** to study large areas of the ocean floor, so many areas have yet to be explored. ¹¹To assist with their studies, these scientists have relied on **satellites** in outer space that have specialized sensors to measure the topography of the ocean floor, the surface temperatures, and ocean currents.

D ¹²The Atlantic Ocean, Pacific Ocean, Indian Ocean, Southern Ocean, and Arctic Ocean are the five oceans that cover the Earth. ¹³Deep under these waters lie large, spreading mountain

ranges, active volcanoes, plateaus, and trenches.

E ¹⁴Surrounding the edges of all oceans is an area of shallow water that may reach depths up to about 130 meters (430 feet) called the **continental shelf**. ¹⁵The continental shelves end at areas called **continental slopes**, which lead to the deep, dark areas of the **ocean basin** that may reach depths of 2.5 to 3.5 miles. ¹⁶Deeper into the waters is the **abyssal plain**, which is the flat ocean floor. ¹⁷The deepest area known thus far is the Mariana Trench at 11,035 meters (36,204 feet) down. ¹⁸It is located south of Japan. ¹⁹Earthquakes and volcanoes also occur in the abyss. ²⁰The volcanoes that arise from this area may, over time, form islands.

F ²¹The oceans are also home to millions of plants and animals that live in **life zones** that can be located from the surface to deep in the trenches. ²²**Phytoplanktons** are microscopic creatures that live near the surface. ²³They are the main source of food for animals that live in the different zones of the sea. ²⁴All plants and numerous animals live in the **sunlit zone**, which is the upper layer of the ocean where sunlight can enter and plants can make food through photosynthesis. ²⁵The **twilight zone** receives some light from the sun but not enough for plants to grow. ²⁶The **deep ocean zone** is sunless and very cold. ²⁷Animals in this zone mainly feed on dead plankton. ²⁸The **abyssal zone** is the completely dark, icy cold bottom layer of the ocean. ²⁹Here there are animals that produce light from their own bodies. ³⁰Finally, the waters that are located in the ocean's deepest trenches are in the **hadal zone**.

G ³¹The variety of life in the sea provides a complex food web that allows all organisms to **survive**.

