# **Oceans Comprehension Check**

1. What is the ocean? Why is the ocean integral to our way of life on Earth?
2. Choose and describe two major coastal features.
3. How does Earth’s oceanic crust compare to its continental crust?
4. What are the four major zones scientists use to describe the ocean? What makes each layer unique?
5. What are surface currents and how do they contribute to the Coriolis effect?
6. Some currents travel around the entire world. Describe how ocean water cycles in this way and why this is important.
7. What are waves and how are they formed?
8. What role does gravity play in creating ocean tides?
9. Describe the steps of the water cycle, including how water cycles around both Earth’s surface and its atmosphere.
10. What are some of the major threats to Earth’s oceans? Why are these concerning and what are some potential solutions?

# **Oceans Comprehension Check Answer Key**

1. What is the ocean? Why is the ocean integral to our way of life on Earth?
   1. The ocean is made of salt water and covers about 70% of Earth’s surface. Oceans help maintain our planet’s temperature by absorbing heat from the sun. Oceans are also home to many plants and animals and provide countless others resources they need to survive. For example, humans rely on oceans for medicine, food, jewelry, gas and oil, energy, transportation, and more! Approximately 80% of the world’s population lives within 60 miles of an ocean coast.
2. Choose and describe two major coastal features.
   1. Students’ responses will vary. They may choose and describe any of the following:
   2. Steep cliffs are formed when waves erode the rock along the shore. Waves can also erode rock along the shore to create natural arches or even caves.
   3. Moving sediment can create a tombolo that connects an island to the shore, a sand bar that connects two areas of land, and a spit or ridge that sticks out into the water.
   4. Lagoons are areas of seawater that have become partially or totally separated from the sea. They contain shallow water and often small animals.
   5. Bays are areas of the coast where the sea is surrounded by land on three sides. Large bays are called gulfs, and small bays are called coves or inlets.
   6. Reefs are underwater ridges that lie close to the shore. They are often made of coral or rock, but artificial reefs are made by humans. Reefs are home to many tiny animals and plants that live together in a community. Reefs can also protect coastlines from storms.
3. How does Earth’s oceanic crust compare to its continental crust?
   1. Earth’s surface layer is called its crust and it is separated into massive portions called tectonic plates. Tectonic plates are made of both oceanic crust as well as continental crust. Continental crust involves all the rock on land (and even the same rock that extends partially into the ocean) and oceanic crust involves all the rock on the ocean floor. The land under the ocean looks quite similar to that above it, with tall mountains, deep valleys, and flat plains.
4. What are the four major zones scientists use to describe the ocean? What makes each layer unique?
   1. Scientists have divided the ocean into different layers, or zones, based on their depth and other characteristics.
   2. The topmost layer is called the sunlight zone. It is generally the warmest layer and contains most of the ocean’s plants and animals. The sunlight zone receives quite a lot of light and reaches from the surface to 660 feet deep.
   3. The second layer is the twilight zone. Almost no sunlight reaches this layer so almost no plants survive, given their need for sunlight to produce their own food. This zone reaches from 660 feet deep to 3,300 feet deep.
   4. The next layer is the midnight zone. Here, the pressure is 100-1,000 times greater than on the surface due to the weight of the water. The water temperatures in the midnight zone are just above freezing. This layer contains bioluminescent animals that have adapted to make their own light to survive the harsh conditions of the deep. The midnight zone reaches from 3,300 feet deep to about 20,000 feet deep.
   5. The final layer is known as the abyss. This is the deepest layer of the ocean and can reach over 33,000 feet deep! The abyss has been compared to a garbage dump as dead sea animals and plants eventually fall to its deep, sea floor. The abyss can contain hydrothermal vents where warm water flows upwards from the ocean floor. Some animals like mussels and giant tubeworms live near these hydrothermal vents, but otherwise there is not much life in the abyss.
5. What are surface currents and how do they contribute to the Coriolis effect?
   1. Surface currents are caused by the wind blowing on the water. The direction of the wind and the position of land around Earth cause surface currents to move in giant circles called gyres. The location in comparison to the equator determines whether the gyre will move in a clockwise direction (north of the equator) or a counterclockwise one (south of the equator). This change in direction is called the Coriolis effect and happens because of the way Earth spins faster at the equator compared to the poles.
6. Some currents travel around the entire world. Describe how ocean water cycles in this way and why this is important.
   1. Some currents travel around the entire world. For example, a current begins in the chilly Arctic Ocean. Because some water freezes in the Arctic, leaving behind its salt, the surrounding water is much saltier, making it heavier and causing it to sink toward the sea floor. New water from the surface replaces this sinking water, creating a current. Changes in temperature and changes in water density, or heaviness, create these deep-ocean currents, which travel for 1,000 years to complete the massive loop across the planet. Cycling currents help spread nutrients throughout the ocean, helping animals to eat and survive.
7. What are waves and how are they formed?
   1. Some people think waves are water moving across the surface of the ocean, but this is not true! Waves are actually energy traveling through the water. Most waves are caused by blowing wind, but they can also be caused by storm surges, earthquakes, landslides, volcanic eruptions, and changing tides.
8. What role does gravity play in creating ocean tides?
   1. Gravity plays a major role in creating ocean tides. The moon’s gravity pulls on ocean waters, causing them to rise and fall. The area of Earth facing the moon and the area directly opposite the moon experience high tide while other parts of the world experience low tide. As Earth rotates, different areas experience the effects of the moon’s gravity, thus experiencing a variety of tides.
9. Describe the steps of the water cycle, including how water cycles around both Earth’s surface and its atmosphere.
   1. The water cycle is the constant movement of both fresh and salt water around Earth’s surface and atmosphere. First, the sun’s heat causes water on Earth to evaporate from the ocean, leaving salt behind. The ocean water is now in its gaseous state and is called water vapor. Cold air in the atmosphere causes the water vapor to change into its liquid form as tiny water droplets. These tiny water droplets then come together to form clouds that releases water as rain or snow. That water lands on Earth, travels through rivers and streams, or even such man-made structures as drainpipes and sewers, until it eventually flows back into the ocean to start the cycle once more.
10. What are some of the major threats to Earth’s oceans? Why are these concerning and what are some potential solutions?
    1. Human activity is putting the oceans at great risk! Overfishing affects the whole ocean food chain because other ocean animals rely on these fish for food. Humans pollute the oceans with plastics and other types of waste that some animals mistake for food and eat. In addition, human actions have contributed to global warming, causing ocean temperatures to rise. This creates other concerns, such as melting Arctic habitats or risks of coastal flooding. In order to protect our oceans from further harm, governments, businesses, and individuals must work to use less plastic, burn fewer fossil fuels, and be aware of how their choices affect the environment.