

How Many Oceans and Seas?



A group of friends went sailing on the ocean. They wondered how many separate oceans and seas there were in the world. This is what they said:

Kendra: I counted the bodies of water on a map. There are more than 100 separate oceans and seas.

Matthias: I think there are seven separate oceans or seas because they have always been called the Seven Seas.

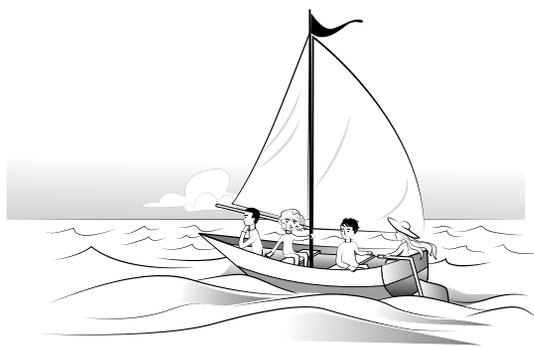
Alejandra: I think there is really only one ocean because water flows freely through all of them.

Tidir: Because they are named for the basins that form them, I count 5 separate oceans and 87 separate seas.

Who do you think has the best idea? _____ Explain your thinking.

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Teacher Notes



Purpose

The purpose of this assessment probe is to elicit students' ideas about the ocean and seas. The probe is designed to reveal whether students use geographic names and locations to consider the number of separate oceans and seas or use the concept of "one ocean."

Type of Probe

Friendly talk

Related Concepts

Concept of one ocean, global ocean conveyor belt, ocean, ocean basins, seas, water circulation

Explanation

The best answer is Alejandra's: "I think there is really only one ocean because water flows through all of them." It is important for students and adults to understand the concept of "one ocean" to understand the global movement of matter and the flow of energy throughout the world's ocean. Throughout the ocean, there

is one interconnected circulation system powered by the wind, tides, the force of Earth's rotation (Coriolis effect), the Sun, and water density differences. The shape of ocean basins and adjacent land masses influence the path of circulation. This "global ocean conveyor belt" moves water throughout all of the ocean's basins, transporting energy (heat), matter, and organisms around the ocean (Ocean Literacy Network 2015).

Although the basins have names that contain the named oceans, all ocean water can move freely around the globe and mix with other named oceans. The term *Seven Seas* has historically meant the Arctic, North Atlantic, South Atlantic, North Pacific, South Pacific, Indian, and Southern Oceans. Currently, a sea is commonly thought to be an extended body of saline water associated with one of the world's five named oceans (Atlantic, Pacific, Arctic, Indian, and Southern). Because there is no strict scientific definition of the term *sea*, it is not surprising that there is no single

defined list of the seas of the world. Some maps may list more than 100 “seas” around the globe.

Administering the Probe

This probe is best used with grades 6–12. Being careful not to give away the answer, point out that the term *separate oceans* means bodies of ocean water that are physically separated from other bodies of ocean water.

Related Core Ideas in Benchmarks for Science Literacy (AAAS 2009)

6–8 The Earth

- Three-fourths of the Earth’s surface is covered by a relatively thin layer of water (some of it frozen), and the entire planet is surrounded by a relatively thin layer of air.

6–8 Processes That Shape the Earth

- Thermal energy carried by ocean currents has a strong influence on climates around the world.

9–12 Processes That Shape the Earth

- Transfer of thermal energy between the atmosphere and the land or oceans produces temperature gradients in the atmosphere and the oceans. Regions at different temperatures rise or sink or mix, resulting in winds and ocean currents. These winds and ocean currents, which are also affected by the Earth’s rotation and the shape of the land, carry thermal energy from warm to cool areas.

Related Core Ideas in A Framework for K–12 Science Education (NRC 2012)

6–8 ESS2.A: Earth Materials and Systems

- All Earth processes are the result of energy flowing and matter cycling within and among the planet’s systems.

6–8 ESS2.C: The Roles of Water in Earth’s Surface Processes

- Global movements of water and its changes in form are propelled by sunlight and gravity.

Related Research

Feller (2007) identified several common misconceptions about the ocean, including the commonly held idea that the three big oceans are not connected and each acts alone.

Suggestions for Instruction and Assessment

- Give an inflatable globe to each pair of students. A flat map of the world that is connected as a cylinder can work as well. Have them put a finger on a part of ocean water. Have them attempt to trace a path around the globe or map without crossing any landforms. This should reinforce the idea that we have only one ocean that is connected to all oceans worldwide.
- Examine the Ocean Literacy Framework at <http://oceanliteracy.wp2.coexploration.org>. The Framework includes the Seven Principles of Ocean Literacy, including Principle #1: The Earth has one big ocean with many features. The Framework also includes a scope and sequence document and graphical conceptual flow maps.
- Seas of the World (Saundry 2013) can be used to support the scientific practice of obtaining, evaluating, and communicating information related to this probe.
- Students can research the history behind the names of the oceans and seas on our maps.

References

- American Association for the Advancement of Science (AAAS). 2009. Benchmarks for science literacy online. www.project2061.org/publications/bsllonline.
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