Chapter 13~1: Exploring the Oceans
Oceans cover **71%** of Earth’s surface (all water = 75%)
Earth’s 5 Oceans

- Largest & Deepest
- Newest
- Smallest
Make a BAR graph showing the **AREA (size)** of the 5 oceans

- Pacific: 156,000,000 km\(^2\)
- Southern: 20,000,000 km\(^2\)
- Atlantic: 77,000,000 km\(^2\)
- Indian: 69,000,000 km\(^2\)
- Arctic: 14,000,000 km\(^2\)
Make another BAR graph that shows the **DEPTH** of the Oceans

- Pacific: 4.3 km
- Southern: 4.0 km
- Atlantic: 3.3 km
- Indian: 3.9 km
- Arctic: 1.0 km

Given the above information, what is the **AVERAGE** depth of all of the oceans?
What is the depth of SEA LEVEL?

- 0 (zero) km
How did Oceans form?

• Billions of years ago, Volcanoes gave off water vapor, which cooled and condensed into clouds, then it rained

• (some moisture may be from Comets)
Salinity (the amount of dissolved solids in the water)

- Salts added to Oceans due to erosion of rivers/streams

- Fresh = no salt
- Brackish = some salt
Where will you find saltier water?

• Saltier in **hotter** and drier climates (more evaporation) ~ lower salinity if it’s cooler, rainier, & at the mouth of a river

• Higher salinity if there is little movement of water (no **currents** to mix the water)
Dissolved salts in the Ocean:

- 55% chlorine
- 31% sodium
- 14% (other: magnesium, sulfur, potassium, & calcium)

so the main salt is NaCl
Main Ocean salt is Sodium Chloride (NaCl).
Salinity varies (average = 3.5%)
Vertical Temperature Zone

**Surface zone** The *surface zone* is the warm, top layer of ocean water. It can extend to 300 m below sea level. Sunlight heats the top 100 m of the surface zone. Surface currents mix the heated water with cooler water below.

**Thermocline** The *thermocline* is the second layer of ocean water. It can extend from 300 m below sea level to about 700 m below sea level. In the thermocline, temperature drops with increased depth faster than it does in the other two zones.

**Deep zone** The *deep zone* is the bottom layer that extends from the base of the thermocline to the bottom of the ocean. The temperature in this zone can range from 1°C to 3°C.
Sea Surface Temperatures
(varies with season and latitude)
Ranges from 1°C near the poles to about 24 °C near the equator
Questions

• Why does coastal water in areas that have hotter, drier climates typically have a higher salinity than coastal water in cooler, more humid areas does?
  • hot/dry areas have more evaporation
• What is the order of Earth’s 5 oceans from largest to smallest?
  • …Pacific, Atlantic, Indian, (Southern), Arctic
Questions

- Which continents border the Atlantic Ocean?
  - North America, South America, Europe, and Africa

- Which substance do fish need to live and take in from water that you take in from air?
  - Oxygen
Review Questions

• About how much of Earth’s surface is covered by water?
  • >>70-75%
• From largest to smallest, the amounts of water on Earth are (choices: liquid surface fresh water, solid fresh water, salt water, ground water).
  • >>>salt water, solid fresh water (ice), ground water, liquid surface fresh water
• For a family of four, what indoor use of water consumes the MOST water per day?
  • >>flushing toilets (then bathing)
An astronaut viewed Earth from space. Which of the following did she observe?

~ A. Earth has seven main oceans that are distinctly different.

~ B. Earth has equal amounts of ocean and land on its surface.

~ C. Ocean water covers about 71% of Earth’s surface.

~ D. Half of the water on Earth is in the Earth’s Oceans.
• ____________ is the most abundant dissolved solid in ocean water.

• **sodium chloride**

• What change in water occurs in the atmosphere at the **condensation** stage of the water cycle?
  ~ A. gas to liquid
  ~ B. liquid to solid
  ~ C. liquid to gas
  ~ D. solid to liquid
Which of the following affects the ocean’s salinity?

• A. Fresh water added by rivers
• B. Currents
• C. Evaporation
• D. All of the above
The largest ocean is the

• A. Indian Ocean.
• B. Arctic Ocean.
• C. Pacific Ocean.
• D. Atlantic Ocean.
The ocean water off the coast of Maine, in the United States, is not as salty as the ocean water off the coast of Morocco, in Northern Africa. Which of the following factors could be responsible for this difference in salinity?

〜 A. climate
〜 B. marine life
〜 C. Ocean pollution
〜 D. deep ocean currents
The top layer of ocean water that extents to about 300 meters below sea level is called the

• A. deep zone.
• B. surface zone.
• C. Gulf Stream.
• D. thermocline.