

**Intro to Oceanography**

Date: \_\_\_\_\_

SWBAT: Describe and diagram the features of the continental margins and ocean basins.

Oceanography is the study of \_\_\_\_\_

- draws on geology, chemistry, physics and biology

Sonar - \_\_\_\_\_

1. Works by transmitting sound waves toward the bottom of the ocean; sensitive receiver intercepts the echo reflected by the bottom

2. Speed of sound \_\_\_\_\_

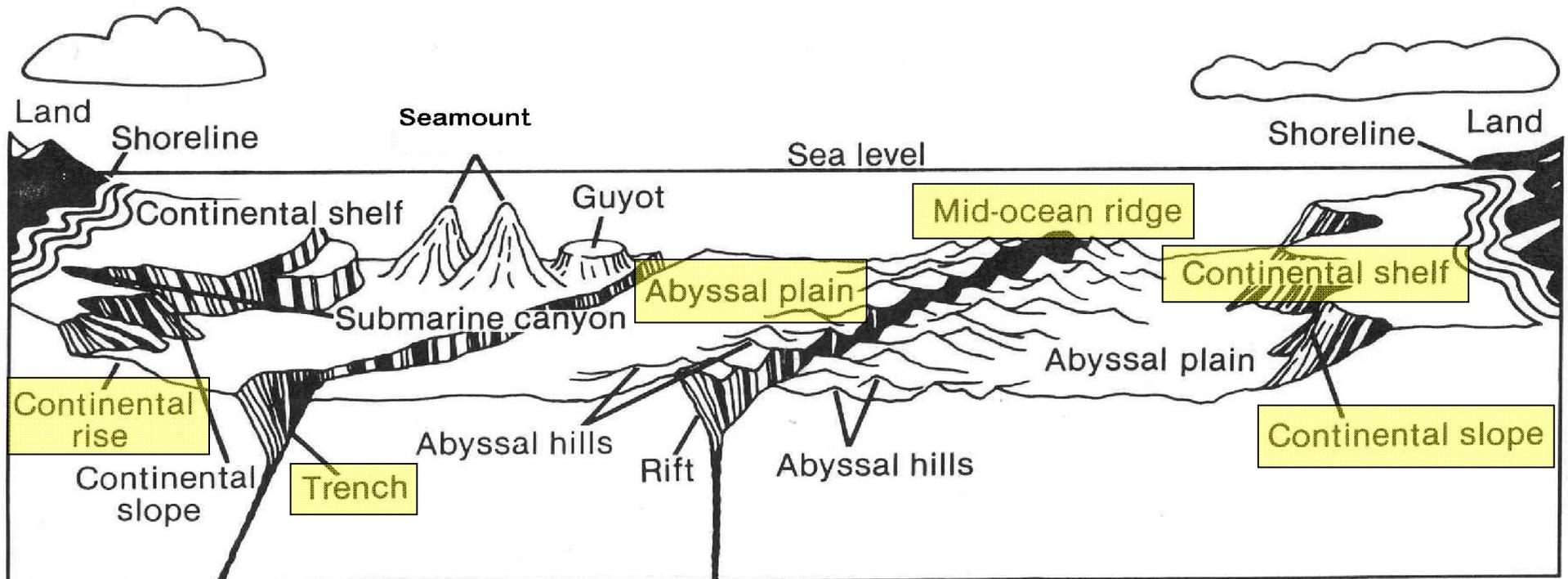
3. The depths determined from monitoring the echoes

• Use for \_\_\_\_\_

The ocean floor is divided into 2 areas:

1. Continental Margin:
  - a. Shallow parts of ocean made of \_\_\_\_\_
  - b. It is not always obvious; it's not the shoreline
  - c. It is the dividing line between \_\_\_\_\_

2. Ocean Basin
  - a. Made of \_\_\_\_\_  
It's the area beyond the continental rise



## Ocean Life and Aquaculture

Date:

SWBAT: Categorize ocean dwellers by movement. Describe how we use the ocean as a food source.

**Classification of Marine Organisms:** Marine organisms can be classified according to \_\_\_\_\_

Marine Ecosystems

• Some of the most diverse marine ecosystems are:

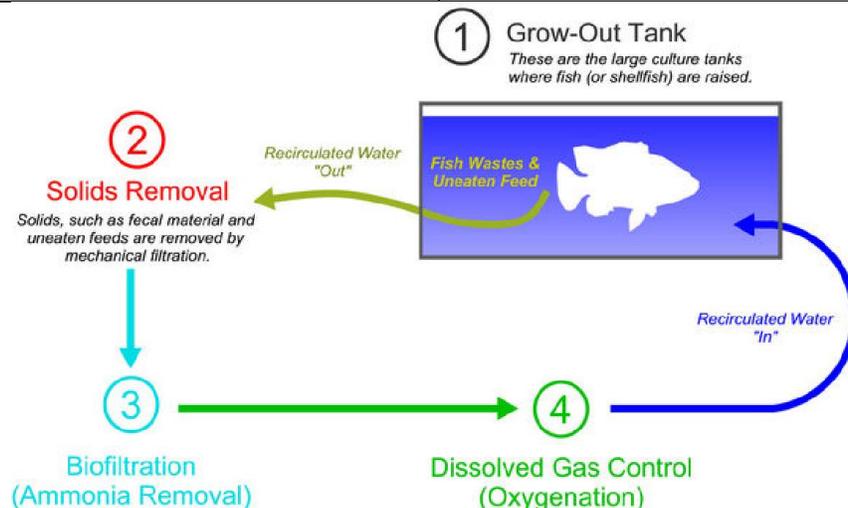
- \_\_\_\_\_ – freshwater and seawater mix
- \_\_\_\_\_ – near surface of tropical waters formed by skeletal deposits of coral

Term	Description
<b>Plankton</b>	All organisms (algae, animals and bacteria) that drift with the ocean currents. <ul style="list-style-type: none"> <li>• Phytoplankton are _____               <ul style="list-style-type: none"> <li>– Phytoplankton perform <i>photosynthesis</i>.</li> </ul> </li> <li>• Zooplankton are free floating, _____               <ul style="list-style-type: none"> <li>– Zooplankton eat phytoplankton.</li> </ul> </li> </ul>
<b>Benthos</b>	any form of ocean life that _____
<b>Nekton</b>	<b>nektos</b> = _____ Animals capable of moving independently of the ocean currents by _____ <ul style="list-style-type: none"> <li>– Ex. Adult fish, squid, marine mammals and reptiles</li> </ul>

Food from the Ocean

- **Aquaculture:** \_\_\_\_\_  
– *Catfish, salmon, oysters, and shrimp*

Traditional	Sustainable
Land-based to ocean-based cultivation	Land-based to ocean-based cultivation
<ul style="list-style-type: none"> <li>• Fishing               <ul style="list-style-type: none"> <li>○</li> </ul> </li> <li>• Substantial contributions to food supplies</li> <li>•</li> <li>• Destruction of coastal ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>• Fishing               <ul style="list-style-type: none"> <li>○</li> </ul> </li> <li>• Plant-based feeds</li> <li>• Does not negatively affect wildlife</li> <li>• Supports long-term economic and social well-being of local communities</li> </ul>



## Temperature, Salinity and Acidification

Date:

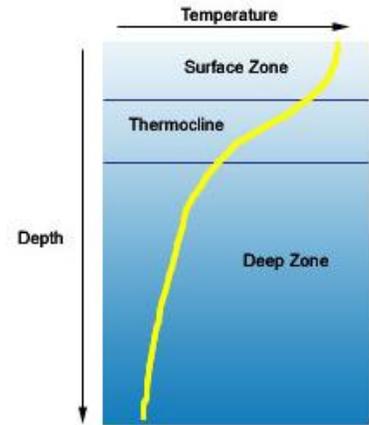
SWBAT: Describe how the ocean temperature changes with depth; determine how salinity affects density.

### Temperature

\_\_\_\_\_ the surface of ocean water (H<sub>2</sub>O)

3 temperature zones of ocean water:

- **Surface zone:** \_\_\_\_\_; sea level to 300m; sunlight only penetrates a few meters, but wind and waves mix heat evenly throughout the surface zone.
- **Thermocline zone:** marked by \_\_\_\_\_; marks the boundary change between the surface zone and the deep zone 300-800m below sea level.
- **Deep zone:** \_\_\_\_\_  
800m-ocean floor.



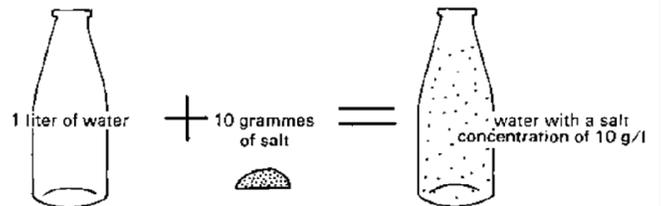
### Salinity

What's in ocean water?

- \_\_\_\_\_ of ocean water is H<sub>2</sub>O
- The other \_\_\_\_\_ is dissolved gases and solids such as salts
  - (NaCl) Sodium Chloride is the main salt in the ocean

Salinity – \_\_\_\_\_ (mainly salts) present in ocean water.

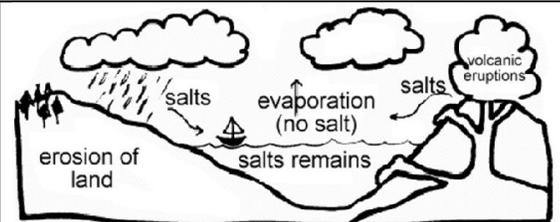
- Average salinity of ocean water is \_\_\_\_\_
  - (%o = parts salt per 1000 parts ocean water)
  - 50 million billion tons of salt in our seas
  - **1,000 g of seawater consists of**  
\_\_\_\_\_ of dissolved salts



- **Large amounts of** \_\_\_\_\_ **salinity.**
- Large amounts of \_\_\_\_\_ **salinity.**

Each year, Earth's rivers carry more and more salt into the ocean. The water evaporates, but the salt is left behind in the ocean

- The principle source of dissolved salts in the ocean is \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Ocean Resources

- Desalination - \_\_\_\_\_

### Ocean Acidification

Excess carbon dioxide from the atmosphere makes its way to the oceans

- The oceans are a \_\_\_\_\_
- CO<sub>2</sub> \_\_\_\_\_ acidity of ocean water
- \_\_\_\_\_ especially (CaCO<sub>3</sub>) calcium carbonate organisms

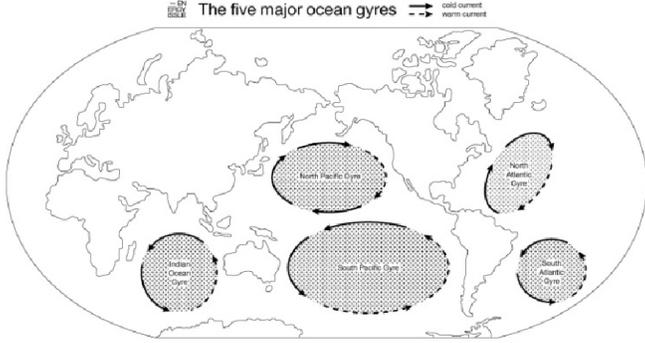
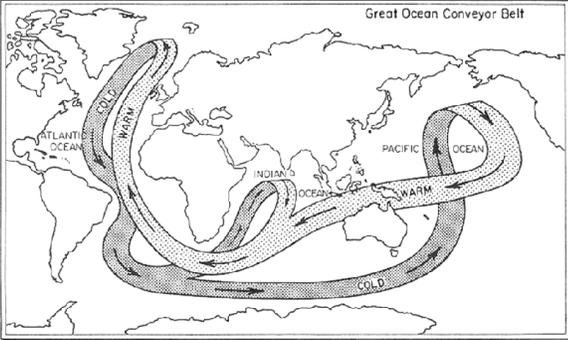
Negative impacts on fisheries

- \_\_\_\_\_
- Decrease in global shellfish production and disruption of livelihoods

## Currents and Climate

Date:

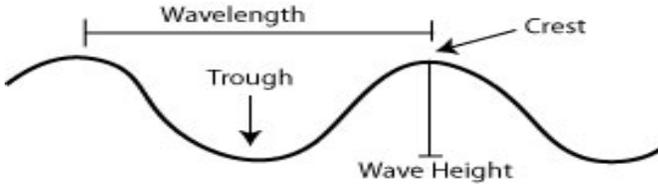
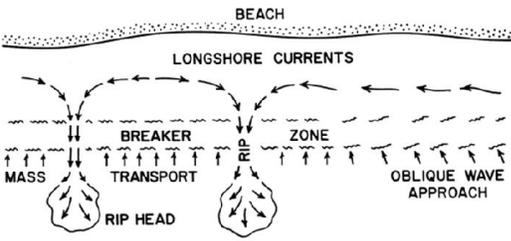
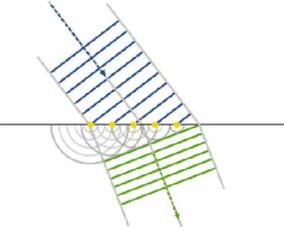
SWBAT: Categorize ocean currents by location, temperatures, surface and density.

Term	Description
Ocean Currents	<p>Definition:</p> <ul style="list-style-type: none"> <li>• Currents can be on the surface of the ocean or in deep water.</li> </ul>
Surface Currents	<p>Definition:</p> <ul style="list-style-type: none"> <li>• The energy that drives surface ocean currents comes from _____</li> </ul>
Gyres	<p>Definition:</p> <p>Why do currents move in a circular pattern?</p> <ul style="list-style-type: none"> <li>• Because of the Earth's rotation, currents are deflected to the _____ and to the _____.</li> </ul> <p>This is called the <b>Coriolis Effect</b></p> 
Ocean Current Impact on Climate	<ul style="list-style-type: none"> <li>• Oceans maintain the balance of heat energy by ocean currents cycling between _____             <ul style="list-style-type: none"> <li>○ When currents from low-latitude regions move into higher latitudes, they transfer heat from warmer to cooler areas on Earth</li> </ul> </li> <li>• Ocean currents are especially important to coastal regions             <ul style="list-style-type: none"> <li>○ _____ the air temperatures along these coastal regions</li> </ul> </li> </ul> <p>An example of this is _____</p>
Deep (density) Currents	<p>Definition:</p> <p><b>Factors that affect the density of seawater:</b></p> <ul style="list-style-type: none"> <li>○ _____</li> <li>○ _____</li> <li>• Decreasing temperature and increasing salinity cause water to become more dense.</li> </ul> <p>Near Antarctica, surface conditions create the highest density water in the world.</p> <ul style="list-style-type: none"> <li>• Evaporation results in increased salinity – _____</li> </ul> <p>A simplified model of ocean circulation is called conveyor belt</p> 
Upwelling	<p>Definition:</p> <ul style="list-style-type: none"> <li>• Winds blow the warm surface water away and it is replaced by cold waters (with lots of nutrients!)             <ul style="list-style-type: none"> <li>○ Deep water is very rich in nutrients and is brought to the surface.</li> </ul> </li> </ul> <p>What's the impact of upwelling?</p> <ul style="list-style-type: none"> <li>• Upwelling revitalizes the ocean and keeps the _____</li> </ul>

## Waves and the Shore

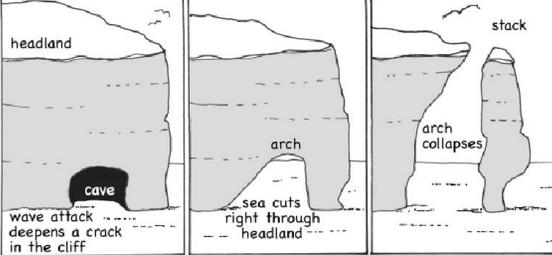
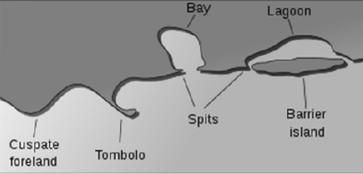
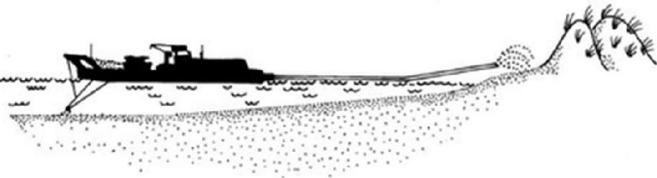
Date:

SWBAT: Identify features of a wave and of wave erosion and deposition.

Term	Description
Waves	<ul style="list-style-type: none"> <li>Waves are ocean energy traveling along the boundary between the ocean and the atmosphere.</li> <li>The power of the waves is most noticeable near the shore.</li> </ul>
Swell	Definition:
Size of a Wave	<ol style="list-style-type: none"> <li>The _____ of the wind.</li> <li>The length of _____ the wind blows.</li> <li>_____ – the distance the wind blows</li> </ol>
Part of a Wave	<p>Crest:</p> <p>Trough:</p>  <p>Wave Height: distance between the _____</p> <p>Wave Length: Distance between _____ (either crest to crest or trough to trough.)</p> <ul style="list-style-type: none"> <li>The average wave length is 2-3 times the wave's height</li> <li>Waves break in water that is as deep as one half the wavelength.</li> </ul> <p>Energy in a wave- As a wave moves across the surface of the ocean, only _____ ...not the water!</p>
Breakers	<p>Definition:</p> <ul style="list-style-type: none"> <li>If the ocean floor is _____, the wave breaks _____</li> <li>If the ocean floor is _____, the wave spills forward with _____</li> </ul>
Longshore Currents	<p>Definition:</p> <ul style="list-style-type: none"> <li>Occurs when waves approach the beach at an angle</li> <li>They often form long sandbars.</li> </ul> 
Refraction	<p>Definition:</p> <ul style="list-style-type: none"> <li>Refraction causes _____</li> </ul> 
Undertow	<p>Definition:</p> <p>Generally a _____ that moves water and sand from the beach back to the shore.</p>
Rip Current	<p>Definition:</p> <p>A _____ current that _____ from the beach carrying sand and water.</p> <ul style="list-style-type: none"> <li>How can a swimmer escape a rip current? Swim _____</li> </ul>

**Wave Erosion and Deposition**

- Waves along the shoreline are constantly \_\_\_\_\_
- Many shoreline features can result from this activity.

Term	Description
Wave-Cut Cliffs and Platforms	<ul style="list-style-type: none"> <li>Result from the cutting action of the surf _____</li> </ul>
Sea Arches and Sea Stacks	<ul style="list-style-type: none"> <li>_____ that extend into the sea, and are _____ on all sides because of _____, are eroded in the center</li> <li>First forming arches and then, when the arch caves in, forming a _____</li> </ul> 
Barrier Islands	<p>Definition:</p> <ul style="list-style-type: none"> <li>They are left over after a rise in sea level over time</li> <li>Or leftover sandbars after a drop in sea level</li> </ul> 
Spits	<p>Definition:</p>
Bars	<p>Definition:</p>
Tombolo	<p>Definition:</p>
Shoreline Stabilization	<ul style="list-style-type: none"> <li>Groins, breakwaters, seawalls, and beach nourishment are designed to _____             <ul style="list-style-type: none"> <li>Groins, breakwaters, and seawalls require construction while beach nourishment does not</li> <li>Only offer _____ to shoreline problems.</li> </ul> </li> </ul>
Beach Nourishment	<p>Definition:</p> <ul style="list-style-type: none"> <li>Most sand comes from offshore.</li> <li>Can be very expensive.</li> <li>_____</li> </ul> 

**Tides**

Date:

SWBAT: Describe the moon's effects on tides, calculate tidal variations, and identify the moon phases.

Term	Description	
Tides	It is caused by the _____ • The moon takes 24 hours and 50 minutes to orbit the earth. • Thus, tides shift by _____	
Tidal Range	Definition:	

Spring Tides	Neap Tides
Occurrence:  Produce:  Occurs during the _____ and the _____ phase • When the Sun, Earth and Moon line up in a straight line, the combined gravity of the Sun and the moon have an effect on the earth's oceans, _____ • Happen every _____ • Daily tidal range is at _____	Occurrence:  Produce:  Occurs during the _____ and the _____ phase • When the Sun, Earth and moon are perpendicular to each other, their gravitational pulls _____ _____ • Daily tidal range is at _____

Friction created between the water and the ocean floor slows the rotation of the earth. (Slowed 10.8 minutes since the dinosaurs died)

Diurnal	Definition: Example: Gulf of Mexico	
Semidiurnal	Definition: Example: East Coast	
Flood Tide	Definition:	
Ebb Tide	Definition:	
Slack Water	Definition:	
Tidal Bore	Definition:	

