Waves and Currents

Essential Question: How are waves and currents created?

Standards:

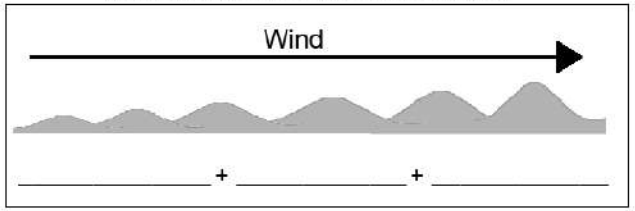
S6E3d. Explain the causes of waves, currents, and tides.

Use your notes to record important information during the lesson.

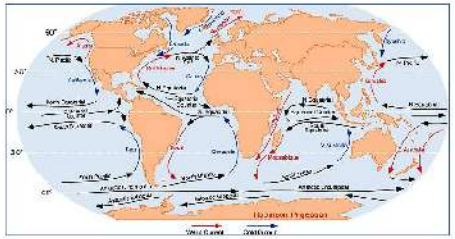
Waves & Currents Name _____ Date _____ Period ___

1. Definition of a wave _____
2. What causes waves? _____
3. Once set in motion, waves _____

Factors that Influence Wind Height



4. Surface currents move water _____
5. Surface currents are powered by _____.
6. Surface currents move in _____ patterns.
7. There are _____ surface currents and _____ surface currents.
8. Surface winds and surface currents are affected by _____.
9. Currents north of the equator _____ and currents south of the equator _____.
10. The ocean _____ the sun's heat (energy). _____ transport this energy.
11. Surface currents move _____.
12. Surface currents can have a _____ or a _____ effect on an area's climate. Why? _____



Waves

A wave is a rhythmic movement that carries energy through matter and space. In the ocean, waves move through seawater.

Causes of Waves

- What are waves caused by? When wind blows across a body of water, wind energy is transferred to the water
- If the wind speed is great enough, the water begins to pile up, forming a wave.

Factors that influence wind height

Speed of the wind + Distance wind blows + Time

Causes of Waves

- Once set in motion, waves continue moving for long distances, even if the wind stops blowing
- The waves you see lapping at a beach could have formed halfway around the world

Currents

Ocean Currents

Ocean currents are a mass flow of ocean water.

There are two main types of currents we will be discussing: Surface Currents and Density Currents

Ocean Currents: Surface Currents

- Surface currents move water horizontally – parallel to Earth's surface
- Surface currents are powered by wind
- The wind forces the ocean to move in huge, circular patterns http://www.livescience.com/19662-animation-reveals-ocean-currents.html
- There are **warm** surface currents and **cold** surface currents

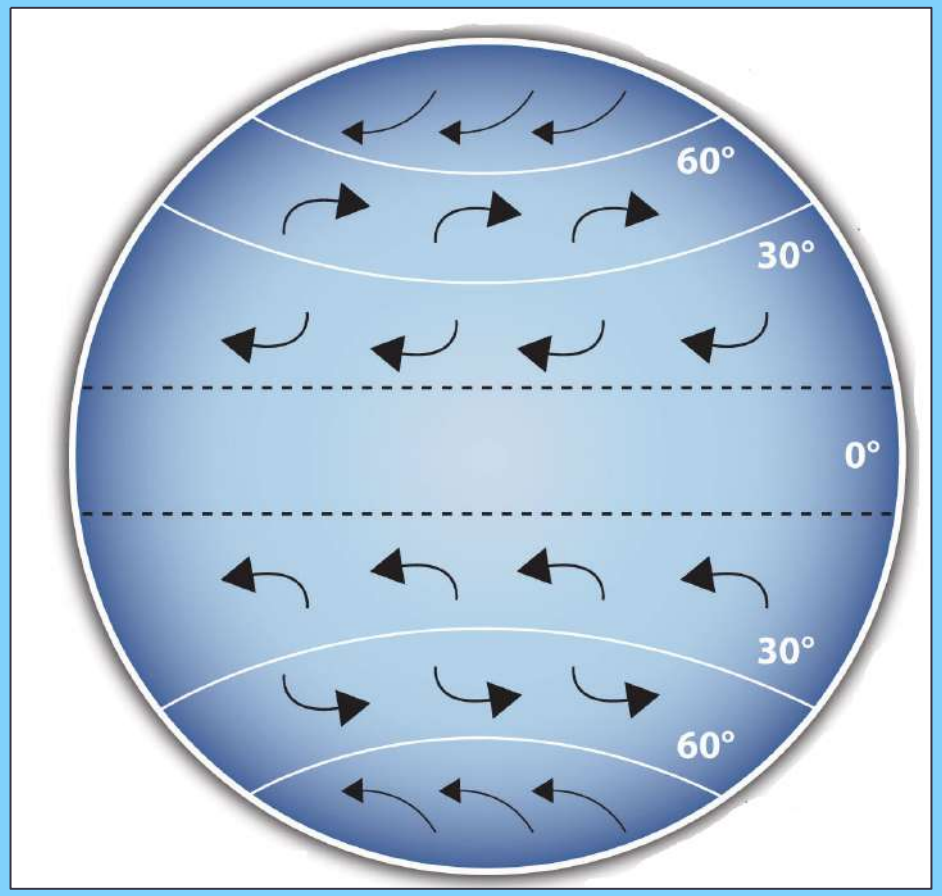
Ocean Currents: Surface Currents

- Surface winds and surface currents are affected by the rotation of the Earth (the Coriolis Effect)

http://www.youtube.com/watch?v=dt_XJp77-mk

- Because Earth rotates toward the east, winds appear to curve to the right in the northern hemisphere and to the left in the southern hemisphere
- So, currents north of the equator turn to the right and currents south of the equator turn to the left

Ocean Currents: Surface Currents



Curving of surface winds due to the Earth's rotation

Animation of Ocean Surface Currents

http://www.classzone.com/books/earth_science/terc/content/visualizations/es2401/es2401page01.cfm?chapter_no=visualization

Animation of Coriolis Effect

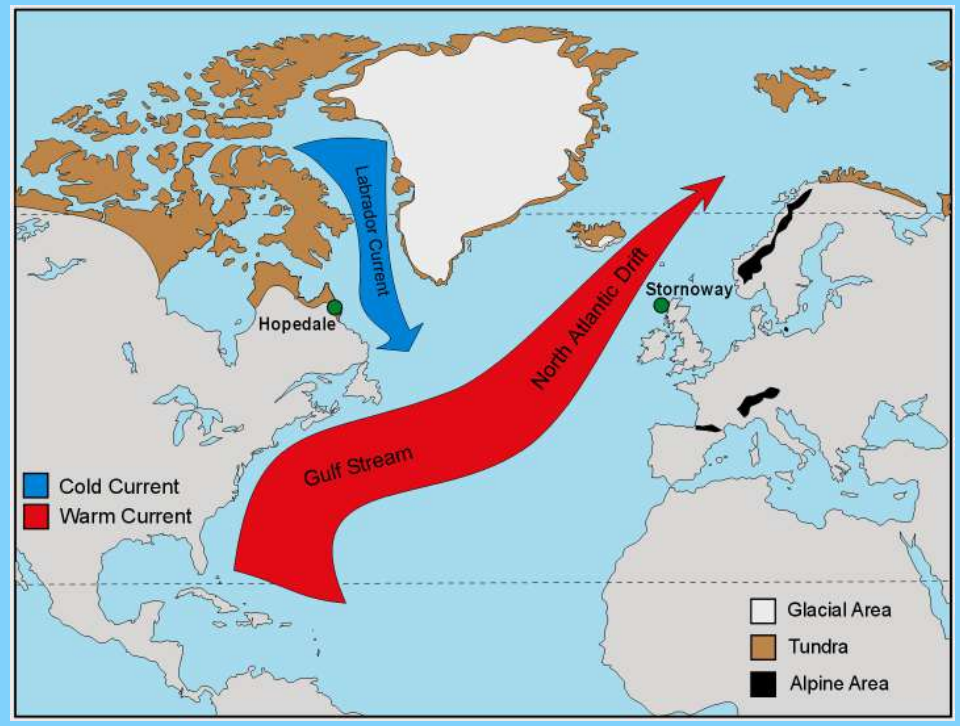
http://www.classzone.com/books/earth_science/terc/content/visualizations/es1904/es1904page01.cfm

Surface Currents Affect Climate

- The ocean absorbs, stores, and moves the sun's heat (energy)
- Surface currents transport this energy all over the world
- Surface currents move warmer water into cooler regions and return cooler water to the warmer regions (tropics)
- Currents can have a cooling effect on an area's climate or a warming effect on an area's climate
- As warm water flows from the equator, heat is released into the atmosphere and the air is warmed.

Surface Currents Affect Climate

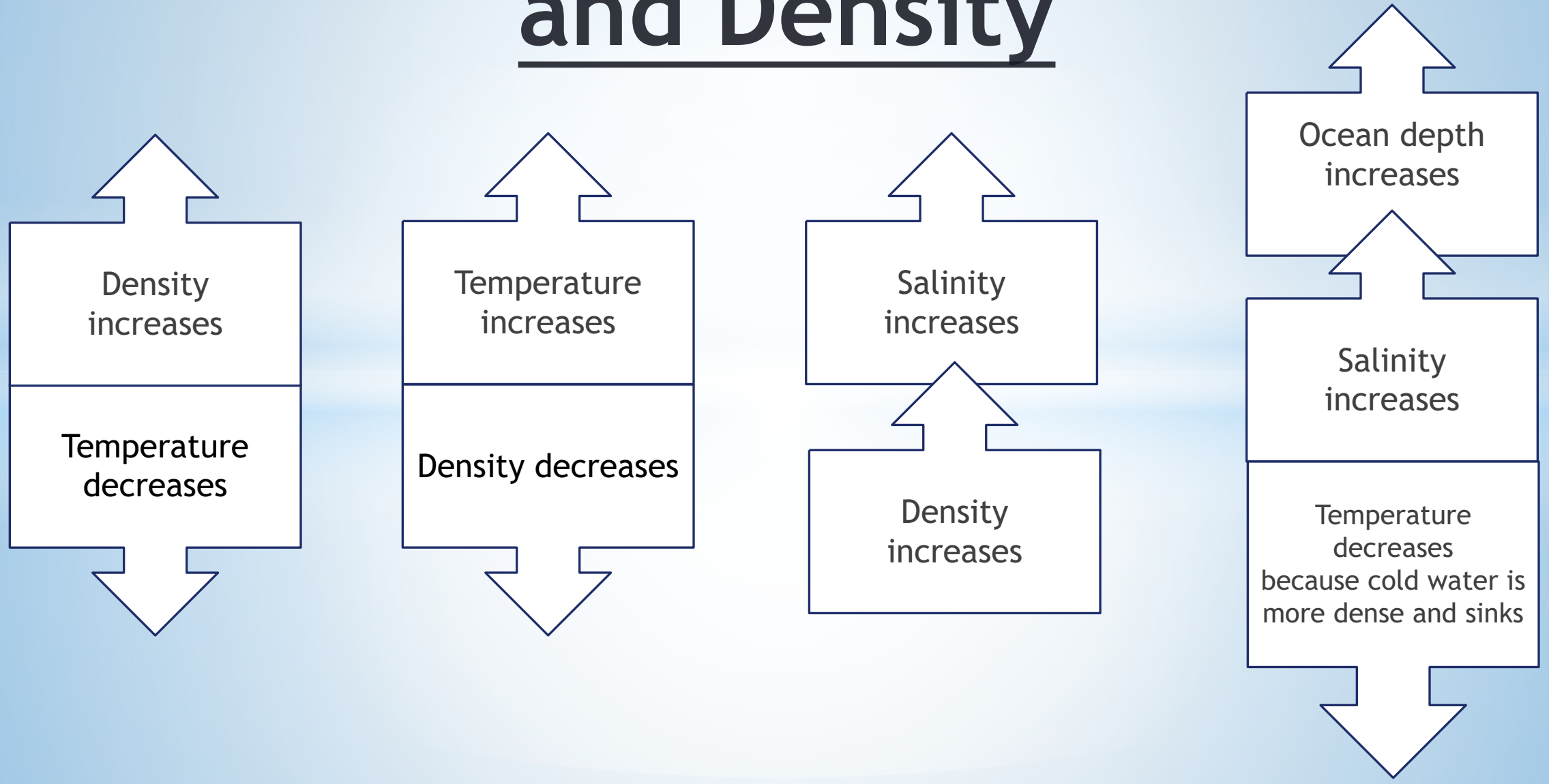
- Think about what you learned in social studies about Europe's climate. What surface current makes Europe's climate temperate (mild)?
- The Gulf Stream is a surface current that moves warm water from the tropics to the cooler regions around Europe.



Gulf Stream and Climate

http://www.youtube.com/watch?v=UuGrBhK2c7U

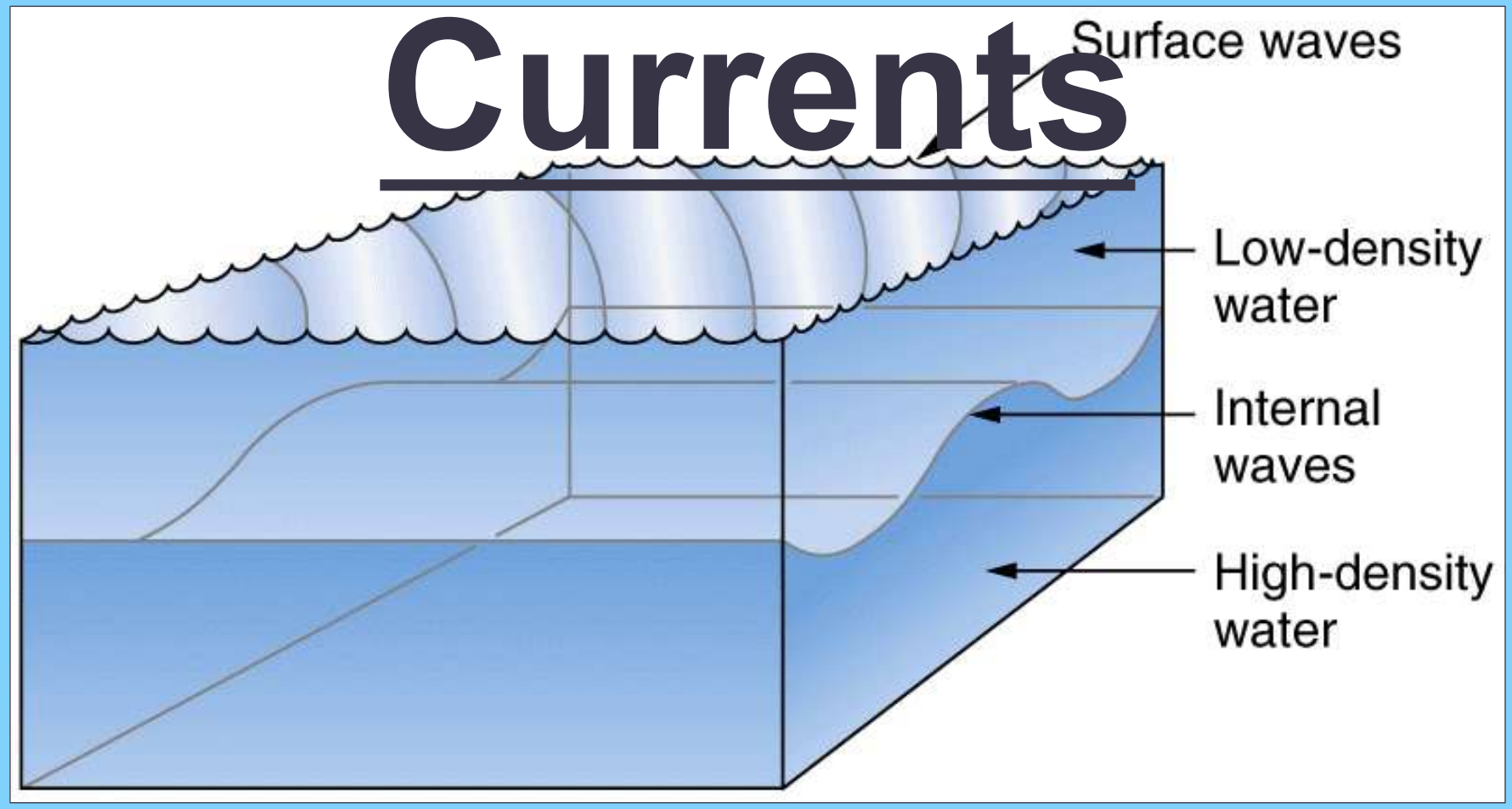
Temperature, Salinity and Density



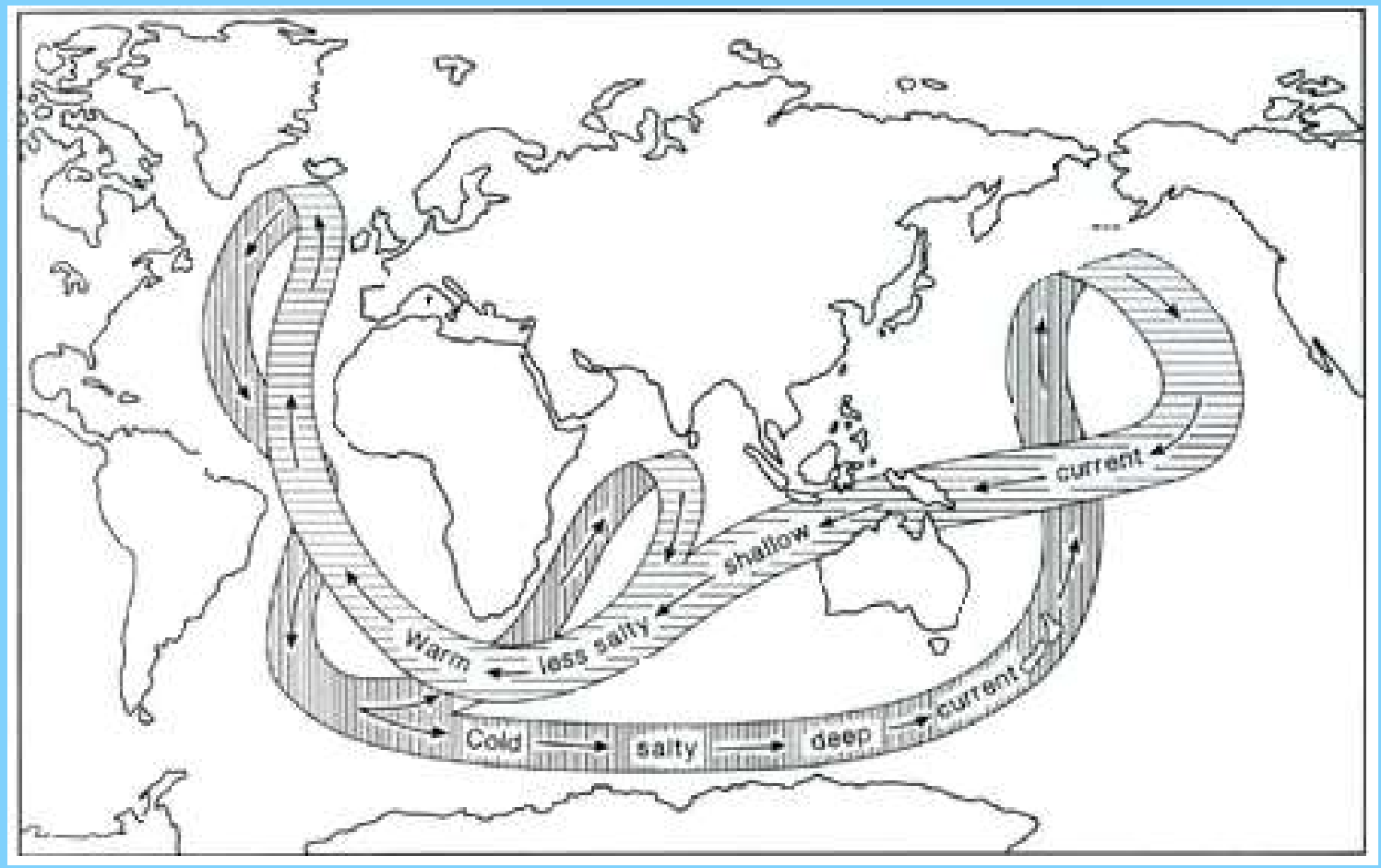
Density Currents

- The movement of water deep in the ocean is caused by a difference in density.
- A density current forms when a mass of seawater becomes more dense than the surrounding water.
- More dense seawater sinks beneath less dense seawater.
- Density currents circulate ocean water slowly.

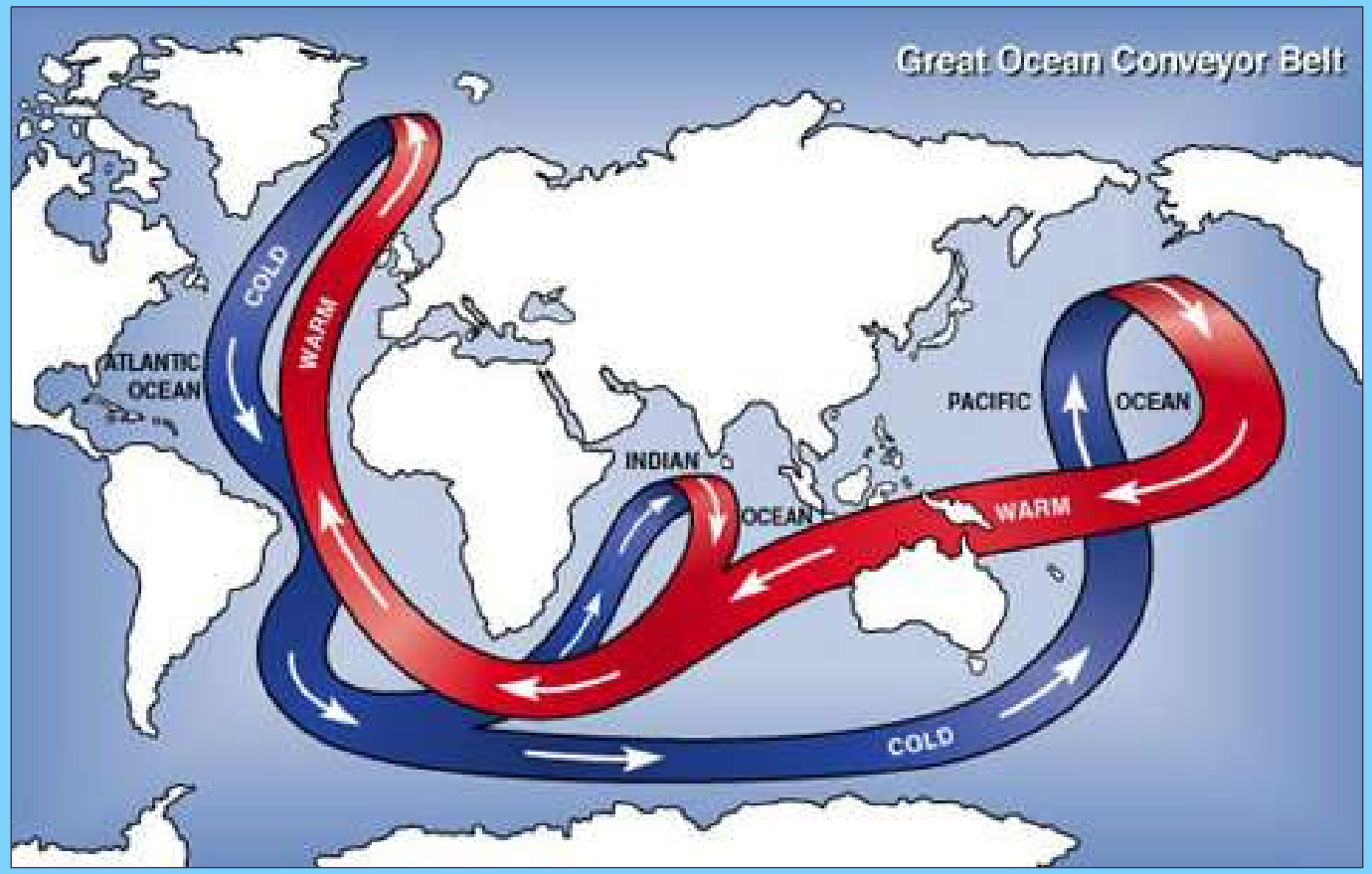
Density Currents



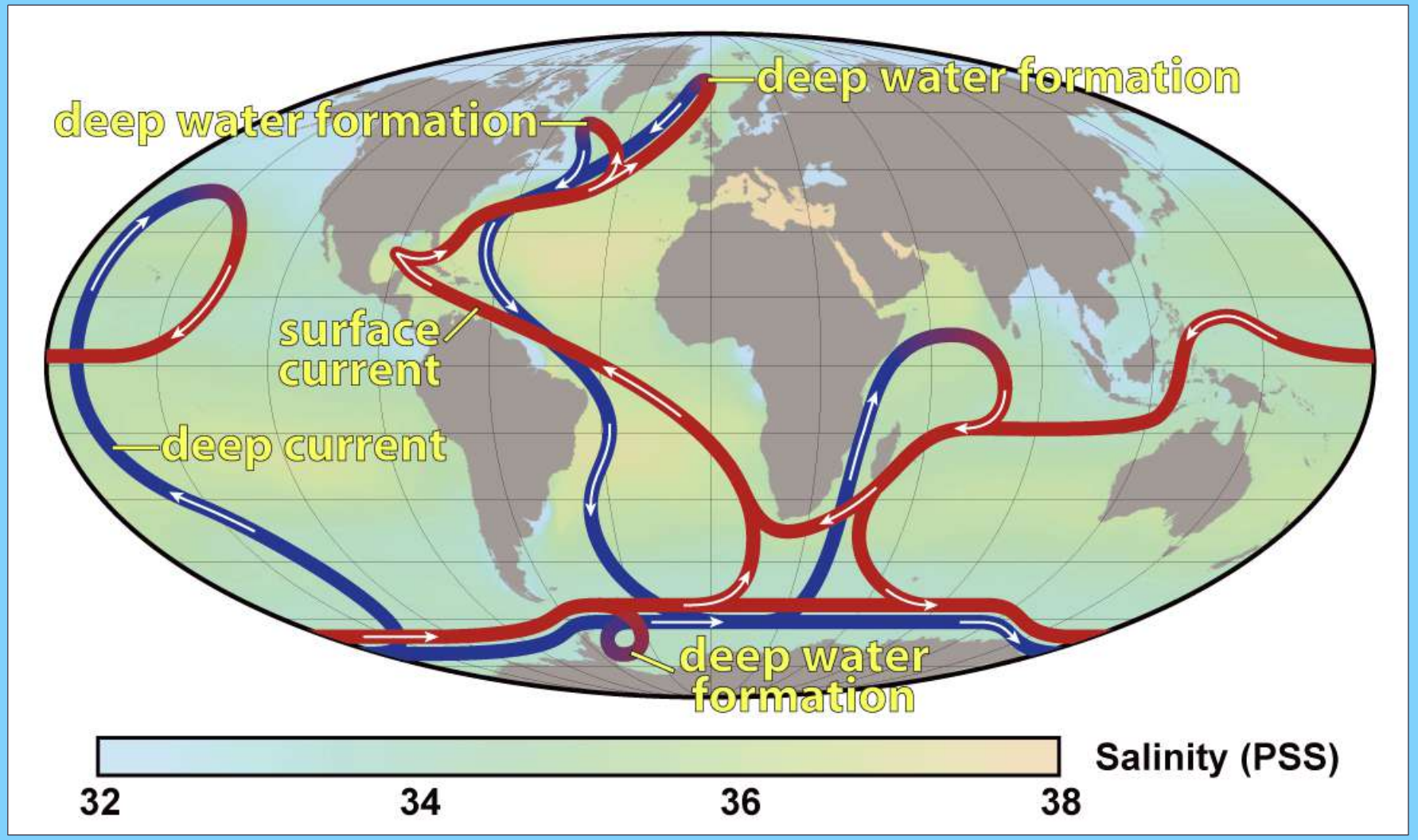
Label on your diagram



Density Currents



Currents


deep water formation
deep water formation
surface current
deep current
deep water formation
Salinity (PSS)
32
34
36
38

Activating Strategy: Watch the video below then answer the questions.

http://video.disney.com/watch/catching-the-eac-4bb39d25a179ea8833003b15

1. Where is this event happening?
2. What causes the condition shown in the video?
3. What do you think is the importance of the condition shown?

Ocean Currents Song

https://www.youtube.com/watch?v=NsdH_NRM-CU

Waves & Currents Video

http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/waves-and-currents.htm