School Name:_____Team Number:____ Team Names:_____

Dynamic Planet Test

This test is worth 100 points, and there are 25 questions. You will have 50 minutes to complete all the questions. Answer each in the blank space given and write LEGIBLY. You do not need to answer in complete sentences.

1. **(3 points) TIEBREAKER #1**

Salinity (in ‰)=1.80655 x Chlorinity (in ‰) **(1 pt for equation)** The average chlorinity is about 19.2‰ and the average salinity is around 34.7‰ **(1 pt for correct salinity, 1 pt for correct units)**

2. **(5 points)**

(1 pt for each correct layer, in the correct order. Minus ½ a pt if either in wrong layer or spelt incorrectly)
#1 Epipelagic
#2 Mesopelagic
#3 Bathypelagic
#4 Abyssopelagic
#5 Hadopelagic or Hadal Zone

3. **(2 points)**

1st Blank: Coriolis 2nd Blank: gyre **(1 pt per answer)**

4. **(4 points)**

    a. Submarine trench: Convergent **(1 pt)**

    b. Mid-ocean ridge: Divergent **(1 pt)**, Transform **(2 pts)**

5. **(6 points)**

(1 pt for name of each breaker, 1 pt for description of each)
Spilling breakers-When the ocean floor has a gradual slope, the wave will steepen until the crest becomes unstable, resulting in whitewater spilling down the face of the wave. This continues as the wave approaches the shore and there is a relatively gentle wave.
Plunging breakers-A plunging wave occurs when the ocean floor is steep or has sudden changes. The crest of the wave becomes steeper, becomes vertical, then curls over and drops onto the trough of the wave, releasing most of its energy at once in a relatively violent impact.
Surging breakers-Originate from long period, low steepness waves and/or steep beach profiles. The outcome is the rapid movement of the base of the wave up the slope and the disappearance of the wave crest. The front face and crest of the wave remain relatively smooth with little foam.

6. **(3 points)**

A thermocline is an area of sudden change in temperature. **(1 pt)**
A pycnocline is an area of sudden change in density. **(1 pt)**
A halocline is an area of sudden change in salinity. **(1 pt)**

7. **(3 points)**
    a. Wave Crest- the top of the wave **(1 pt)**
    b. Amplitude-half of the wave height, from crest or trough to resting position **(1 pt)**
    c. Wave Height-distance from crest to trough **(1 pt)**

8. **(2 points)**

A sediment-laden current **(1 pt)** usually triggered by seismic activity, such as an earthquake or volcanic eruption **(1 pt)**.

9. **(5 points)**

(minus ½ for spelling errors)

a. MSL: Mean Sea Level **(1 pt)**
b. SST: Sea Surface Temperature **(1 pt)**
c. ITCZ: InterTropical Convergence Zone **(1 pt)**
d. ENSO: El Nino Southern Oscillation **(1 pt)**
e. SONAR: SOund Navigation And Ranging **(1 pt)**

10. **(4 points) TIEBREAKER #2**

The cycle that describes the opening and closing of ocean basins. **(1 pt)**
A continent breaks apart and seafloor spreading starts, creating the new ocean basin. **(1 pt)** The ocean widens has passive margins on its sides. **(1 pt)** Subduction begins in one margin, closing the basin, and is destroyed when plates collide to form a mountain range. **(1 pt)**

11. **(5 points)**

a. 7.8 **(1 pt)**
b. 8.1
c. 8.5

Cause of pH change: Global warming and an increase in CO_2 leads to ocean acidification. **(1 pt)** The average pH of the ocean now is 8.1. **(1 pt)** Studies show that coral will begin to die after the water has a pH of 7.8. **(1 pt)** As the ocean is one of the major reservoirs of CO_2, the increase in CO_2 levels from a decrease in pH. **(1 pt)**

12. **(5 points)**

A volcanic island becomes extinct. (1 pt) The island and and ocean flood subside and coral grows a fringing reef. (1 pt) Subsidence continues and the fringing becomes a barrier reef with a deeper lagoon that furthers the distance between reef and shore. (1 pt) Finally, the island sinks under the sea and the barrier reef becomes an atoll surrounding an open lagoon, often circular in shape. (1 pt) Charles Darwin created this theory. (1 pt)

13. **(5 points)**

Wind blows parallel to the shore, over the sea. **(1 pt)** The water moves 90 degrees from the wind direction because of the Coriolis effect and Ekman transport. **(1 pt)** Ekman transport causes the surface water to move at about 45 degrees from the wind. Then the Coriolis effect causes the water to move to the right in the northern hemisphere and left in the southern hemisphere. **(1 pt)** If the water moves away from the area, then water from below moves up to replace the water lost. **(1 pt)** The water that comes up to the surface is cold and nutrient-rich. **(1 pt)**

14. **(4 points)**

The CCD is the Calcium Compensation Depth. **(1 pt)** It is the depth at which calcium carbonate becomes soluble. The more acidic the water, the smaller the value of the CCD. **(3 pts)**

15. **(2 points)**

About 10 meters **(1 pt)** 14.5 psi **(1 pt)**

16. (5 points)

Active margins are tectonically active, but passive are not. **(1 pt)** Active margins have less sediment than passive. **(2 pts)** Passive margins are wider than active. **(2 pts)**

17. (4 points)

Hydrothermal **(fill in the blank, 1 pt)**
(1 pt for each difference, possible total of 3 pts)
Black smokers release hotter water than white smokers.
Black smokers emit high levels of sulfides, while white smokers emit things like barium, calcium, and silicon.
Black smokers have a black, chimney-like appearance and release dark colored water, while white smokers emit light colored water and have a white, chimney-like appearance.

18. (3 points)

0-Calm **(1 pt)**
5-Fresh Breeze **(1 pt)**
12-Hurricane **(1 pt)**

19. (3 points)

(all or nothing)
The ratio of major salts in different parts of the ocean is always constant.

20. (2 points)

The Bay of Fundy has the largest tidal range in the world. (2 pts)

21. (3 points)

(all or nothing)
Thermohaline circulation is the part of the large-scale ocean circulation supposedly driven by density differences caused by surface temperature and freshwater input.

22. (2 points)

A seamount is an underwater mountain of volcanic origin and usually dormant **(1 pt)**, while a guyot is a flat-topped seamount. **(1 pt)**

23. (2 points)

Seismic activity, underwater explosions, meteorite impacts, and all disturbances that cause the displacement of a large amount of water. **(2 pts)**

24. (2 points)

1:7 **(2 pts)**

25. (16 points)
(2 pts for every definition)

a. Spring tide: a tide caused when the moon, sun, and Earth align, when the tidal range is greatest.

b. Semi-diurnal tidal cycle: a tidal cycle in an area that experiences two high and two low tides of approximately equal size every lunar day.

c. Ebb: the period between high tide and low tide during which water flows away from the shore, the receding tide.

d. Diurnal tidal cycle: a tidal cycle in an area that experiences one high and one low tide every lunar day.

e. Neap tide: a tide caused when the moon and sun are at right angles, when the tidal range is smallest.

f. Flow: the period between high tide and low tide during which water flows towards the shore, the incoming tide.

g. Amphidromic point: the stationary spot around which tides radiates and the tidal range is zero, or almost zero.

h. Mixed tidal cycle: a tidal cycle in an area that experiences two high and two low tides of different size every lunar day.