Piedmont IB Middle School Science Olympiad In-school Competition #1

Division B Dynamic Planet Event (Oceanography)

Date: 10/4/2014

Student First and Last Name: (1 point) _____

Section 1 (17 points)

Give a brief response (1-2 sentences) for each of the following questions.

1. Why is the ocean salty? (1 point)

2. List three sources of salt in the ocean. (3 points)

3. ~~What role does the salinity or the concentration of salt have in regulating global temperature? (1 point)~~

4. Name two typical features of deep-ocean basins. (2 points)

5. How does a continental margin differ from a deep ocean basin? (1 point)

6. Why does water look blue? (1 point)

7. How is heat different from temperature? (1 point)

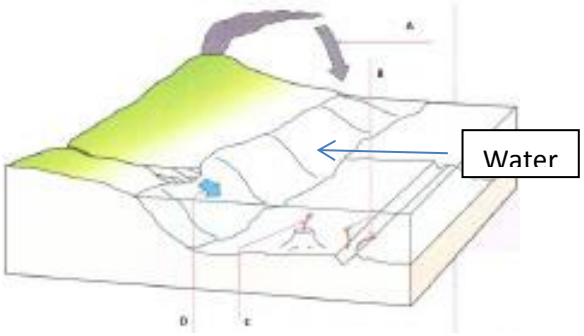
8. What is the unit used to express seawater's salinity? Explain. (2 point)

9. Name two functions of the oceans. (2 points)

10. Name the three layers of the ocean. (3 points)

Section 2 (9 points)

11. Input of Ions into Ocean



Match the images shown on the screen with the correct inputs of ions from the oceans indicated in the diagram above.

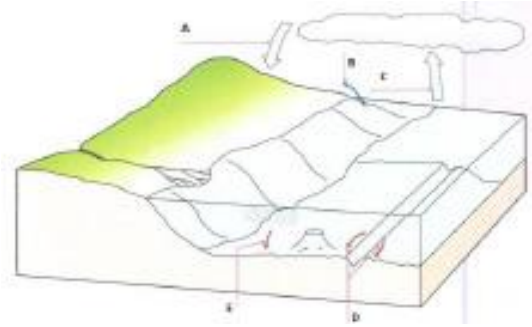
A._____

B._____

C._____

D._____

12. Output of Ions from Ocean



Match the images shown on the screen with the correct outputs of ions from the oceans indicated in the diagram above.

A._____

B._____

C._____

D._____

E._____

Section 3 Multiple Choice (14 points)

For questions 13-18, select one of the following answers and write its associated letter on the answer sheet. (1 point each)

A) increases B) decreases C) remains the same

13. At constant temperature, as the salinity of seawater increases, density _____.

14. As depth of seawater increases, temperature _____.

15. As depth of seawater increases, salinity _____.

16. As water cools from 20^{o}C to 4^{o}C, its density _____.

17. As water cools from 4^{o}C to 0^{o}C, its density _____.

18. As a block of sea ice melts its temperature _____.

For questions 19–26, circle the correct answer. (1 point each)

19. Where fresh river water joins salty ocean water, it is known as

    A. Silted
    B. Brackish
    C. Polluted
    D. Backwash

20. The vertical movement of crust to accommodate additional weight or removal of weight is called

    A. isotonic positioning
    B. isostatic adjustment
    C. isometric rebounding
    D. internal expansion
    E. interval submersion

21. The reason that ice is less dense than water – which causes ice to float – is due to:

    A. the molecular packing of bulky ice crystals
    B. thermal contraction
    C. slower molecular motion
    D. its high latent heat of melting
    E. its high latent heat of condensation

22. Which of these is not a greenhouse gas?

    A. CFC
    B. CO_2
    C. Methane
    D. O_2

23. The Earth, maintaining a significantly cooler surface temperature than the Sun, emits _____

    A. ultraviolet radiation
    B. shortwave infrared radiation
    C. longwave radiation
    D. visible light

24. In the open ocean, average seawater salinity is…

    A. 0.0035 $^0/_{00}$
    B. 0.035 $^0/_{00}$
    C. 0.35 $^0/_{00}$
    D. 3.5 $^0/_{00}$
    E. 35 $^0/_{00}$
    F. None of the above.

25. Which of the following INCREASES the salinity of seawater?

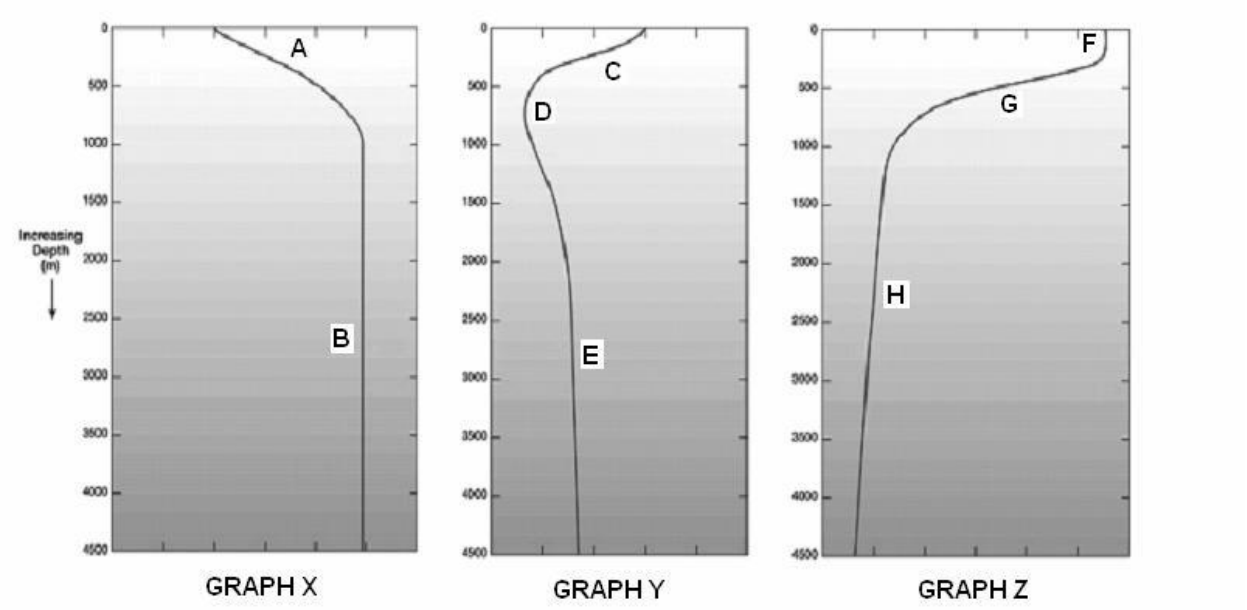
    A. Runoff entering the ocean
    B. Precipitation into the ocean
    C. Icebergs melting in the ocean
    D. Evaporation of sea water
    E. The first two choices only

26. A layer of rapid change of ocean density with depth is called a

    A. Thermocline.
    B. Halocline.
    C. Pycnocline.
    D. Nutricline.
    E. Salicline.

Section 4 (8 points)

For questions 27-31, use the three graphs shown below. All three graphs are associated with mid-latitudes in the South Atlantic. (1 point each)



27. Which graph indicates temperature versus depth?

28. Which graph indicates salinity versus depth?

29. Which graph indicates density versus depth?

30. Which letter on the graphs indicates the pycnocline?

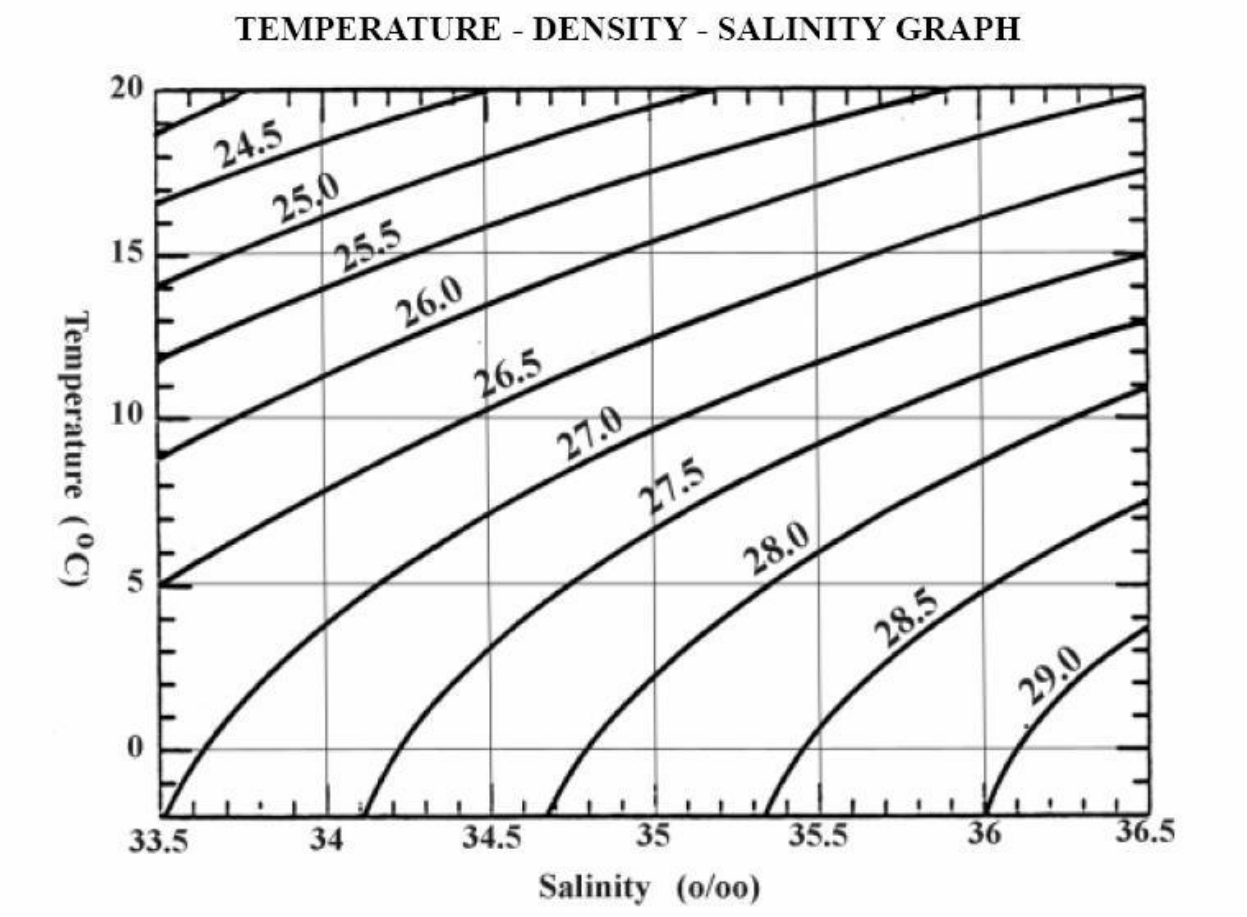
31. Which letter on the graphs indicates the thermocline?

For questions 32-34, use the Temperature – Density - Salinity graph shown below to find the answer. (1 point each)

32. According to the graph shown below, what is the density in g/cm^3 of a sample of salinity 34.5($^o/_{oo}$) and temperature 7 ^{o}C?

33. According to the graph shown below, what is the salinity of a water sample with a density of 1.028 g/cm^3 at a temperature 8 ^{o}C?

34. What are the units of the salinity scale across the horizontal axis of the temperature-density-salinity graph?



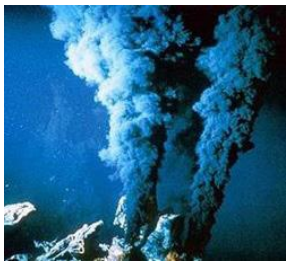
Bonus Section (10 points)

Draw a rough outline of an ocean basin. Label the major parts.

Images for Section 2

Volcanic Eruption

Living Organisms



Hydrothermal Vents

Clouds

Undersea Volcano

Sea Spray

Precipitation

Runoff

Infiltration Into Crust