

1. **Tiebreaker #1** What was the name of the late 19th century British ship that laid the foundation for the modern science of Oceanography? (1)
2. What is used to determine the depth of the ocean floor? (1)
3. Iceland is an example of where a _____ rises above sea level.(2)
4. What is created when a mid ocean ridge separates at different rates and the new crust breaks into a series of faults that run perpendicular to the ridge? (2)
5. What are the three principle gases found in the ocean? (3)
6. What ocean has very low salinity because of the low evaporation rate and the large amounts of fresh water that enter this ocean? (2)
7. What ocean zone has little or no sunlight, has scarcity of plant life, and yet is home to octopuses and sea stars? (1)
8. What is the most valuable mineral resource taken from beneath the sea floor? (1)
9. Which ocean current moderates the temperatures along the East Coast of the U.S.? (2)
10. Explain what causes the following feature to occur? (3)



11. What type of current forms sandbars? (1)

12. What are the tides called when higher high tides occur and lower low tides occur? (1)

13. Hot spots are the point on earth's surface directly above what feature? (2)

14. True or False? Flocculation is faster in fresh water than sea water? (1)

15. What is the rock type that composes the ocean floor? (2)

16. The flat and featureless part of the sea floor is called what? (1)

17. What is the flooded edge of the continent, not the body of water above it? (1)

18. True or false? All guyots were once islands? (1)

19. In the Atlantic region we refer to these storms as hurricanes. Where in the world would you be if we referred to the storm as a cyclone? (2)

20. How many Atlantic hurricanes have there been by the time Hurricane Grace hits Miami? (1)

21. Which letters are never used when naming hurricanes? (3)

22. Which hurricane was the most costly storm ever on U.S soil? Approximately How costly?(2)

23. Explain the difference between (3)

tropical disturbance

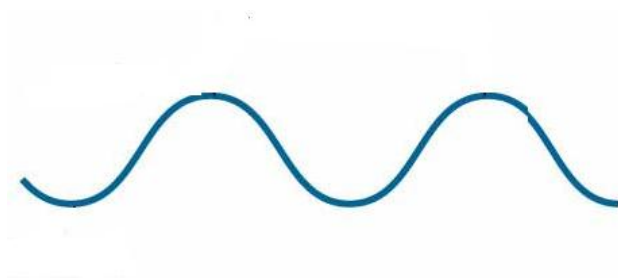
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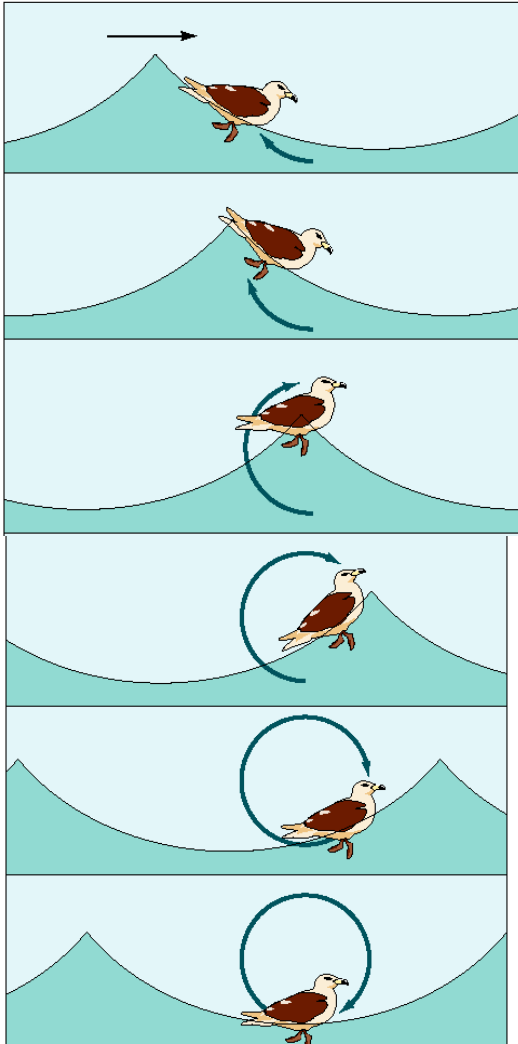
24. What month typically sees the most hurricanes in North Atlantic? Why? (2)

25. Which hurricane track, coast parallel or coast normal would cause the most coastline damage along the east coast and why? (3)

26. Mark the crest, trough wavelength and amplitude on the following wave (4)



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27. What principle of waves is being shown in this diagram? (3)

28. At what depth does this principle become negligible? (3)

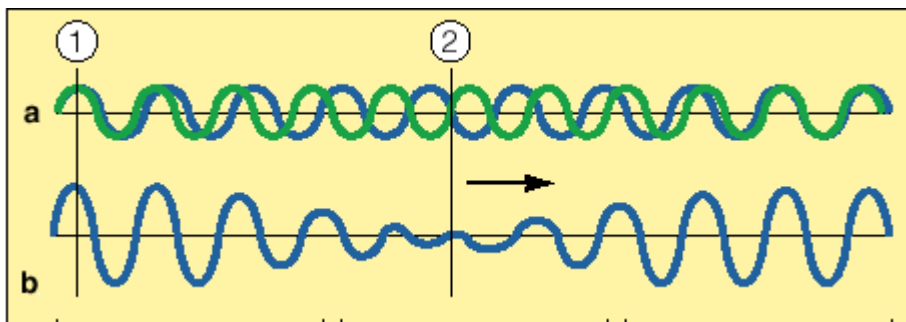
29. True or False Waves with wavelengths less than 1.73 cm are called capillary waves. (1)

30. What is a free wave and what would cause a free wave to form? (2)

$$C \text{ (in meters per second)} = \frac{gT}{2\pi}$$

31. If C =speed, $g=9.8 \text{ m/s}^2$, and T =period. Calculate the speed of a wave in miles per hour if the period is 15 sec. (4)

32. What 3 factors affect wave development? (3)



33. What wave feature is occurring at point 2? (3)



34. What feature of waves is being shown around Maili point Oahu, Hawaii? (3)

35. What causes a storm surge? (2)
36. What temperature in Celsius does seawater freeze at? (2)
37. How does the salinity of sea ice compare to the salinity of seawater? Why? (3)
38. Where do icebergs come from and what type of water are they made of? (2)
39. In an estuary, where would one find salt water and why? (2)
40. Rank the following bodies of water in order based on how easy it would be to float in them: Dead Sea, Lake Superior, and Gulf of Mexico. Explain why you put them in this order. (2)
41. What is attrition and how does it cause erosion? (2)
42. In an area with a diurnal tide, high tide occurs at 11:50 am. What time will the next high tide occur? (2)
43. **Tiebreaker #2** If you were adrift somewhere between Nova Scotia and Greenland and the wind was blowing from the west. (3) What direction would your raft move due to the Coriolis Effect?

44. What general time of day would you expect to experience a sea breeze? (1)

45. Explain the difference between a land breeze and a sea breeze forms. (4)

46. Put the following features in order from youngest to oldest: drowned reef, atoll, barrier reef, and fringing reef. (2)

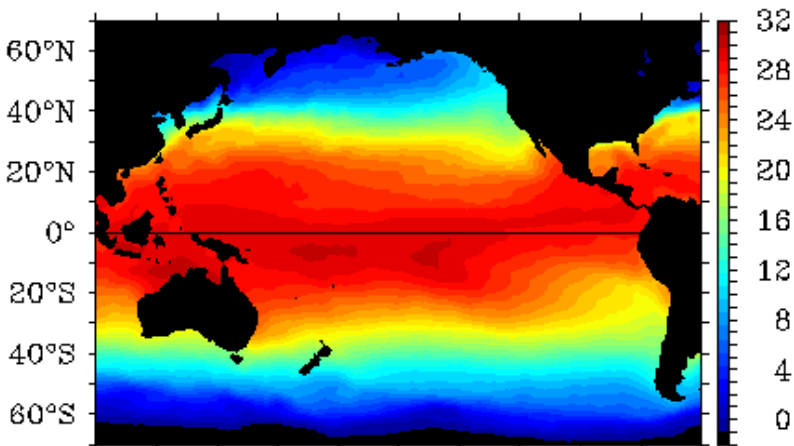
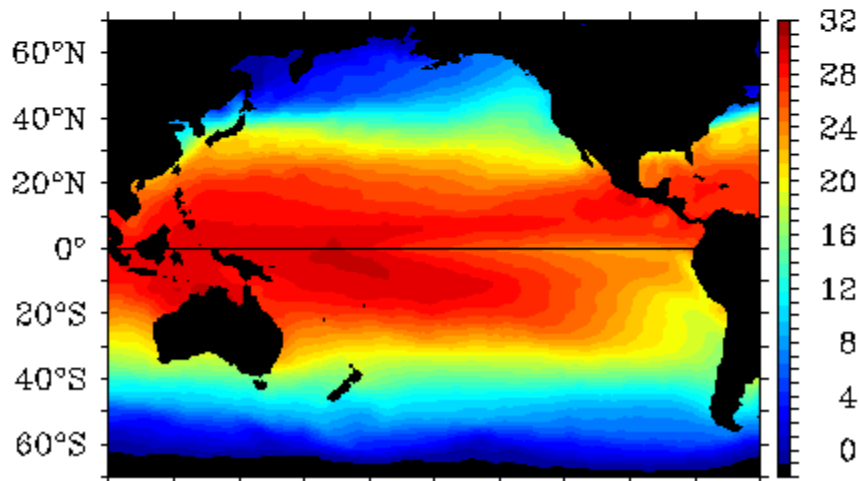
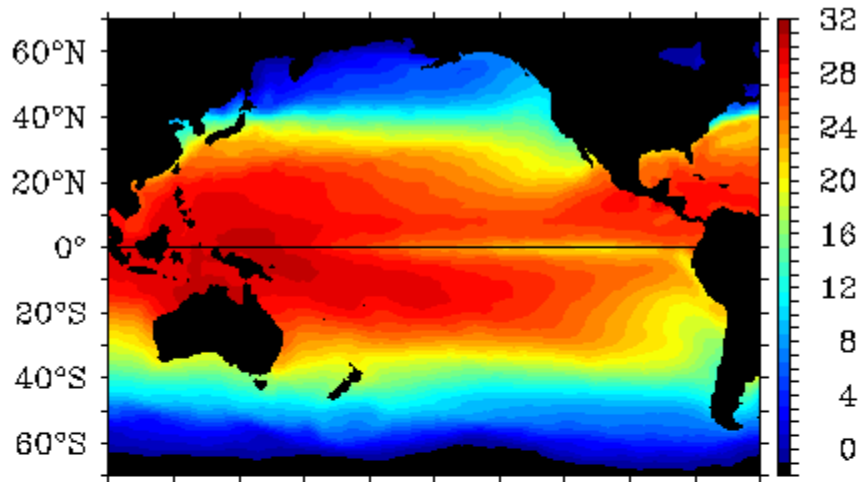
47. Explain how the Hawaiian Islands formed in the manner you see in the picture below.(3)



48. Which Hawaiian Island in the above picture is the oldest? (3) Why?

49. Put the following zones in order based on depth: epipelagic, hadalpelagic, bathypelagic, mesopelagic, abyssalopelagic. (1)

50. Which of the zones contains the thermocline? (2)
51. Which zone(s) receive sunlight? (1)
52. Where would you find the least dense seawater? (1)
53. List 2 factors that influence seawater density and explain how they work. (2)
54. **Tie Breaker #3:** What did Chris Farley say “El Nino” means during his famous sketch on Saturday Night Live? (3)
55. When an El Nino occurs, what weather condition occurs over western Pacific lands? (2)
56. How are El Nino and La Nina different? Explain the difference in the cause of the event and the effects of the events (4)



100°E 140°E 180° 140°W 100°W 60°W
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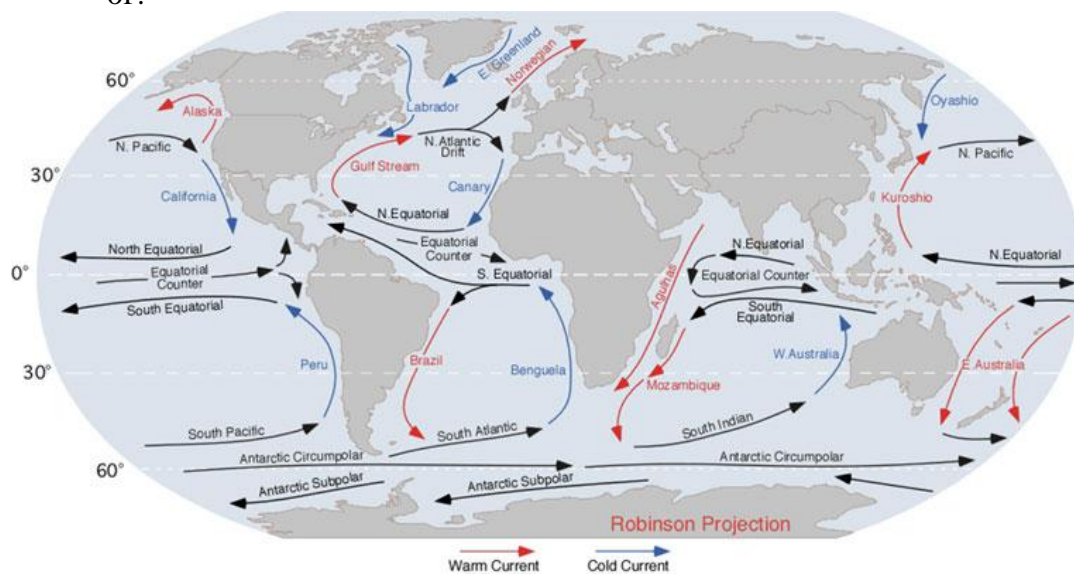
57. Based on the following diagrams, label each diagram as El Nino, La Nina, and Normal conditions (3)

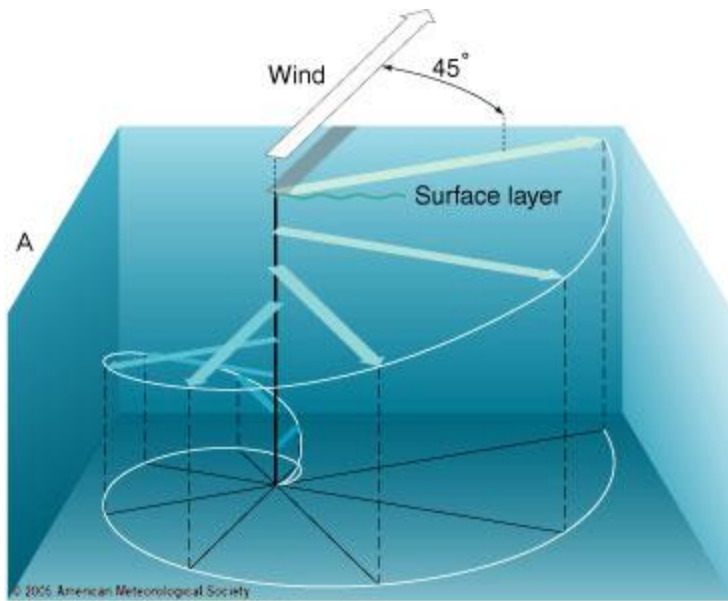
58. During an El Nino how do the sea levels in the Philippines and Panama compare? Why does this happen? (3)

59. What is a red tide and what causes?

60. What is the average speed of the Gulf Stream current in km/hour? How does this speed rank compared to other ocean currents?

61. What are the Gulf Stream, North Atlantic, Canary, and N. Equatorial currents an example of?





62. What is the above diagram an example of? (1)

63. In relation to continents in the Northern Hemisphere, where is upwelling most likely to occur? (2)

64. What is the following structure called? (1)



65. What is this structure called? (1)

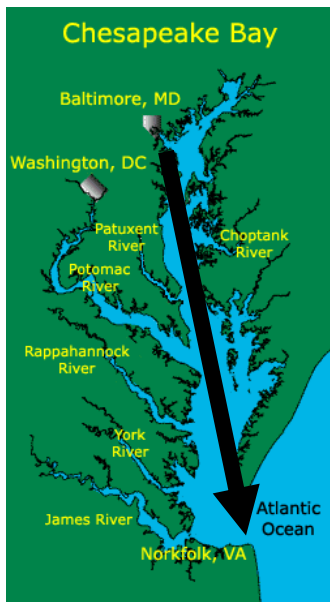


66. 1 kilogram of seawater has approximately how many grams of salt? (1)

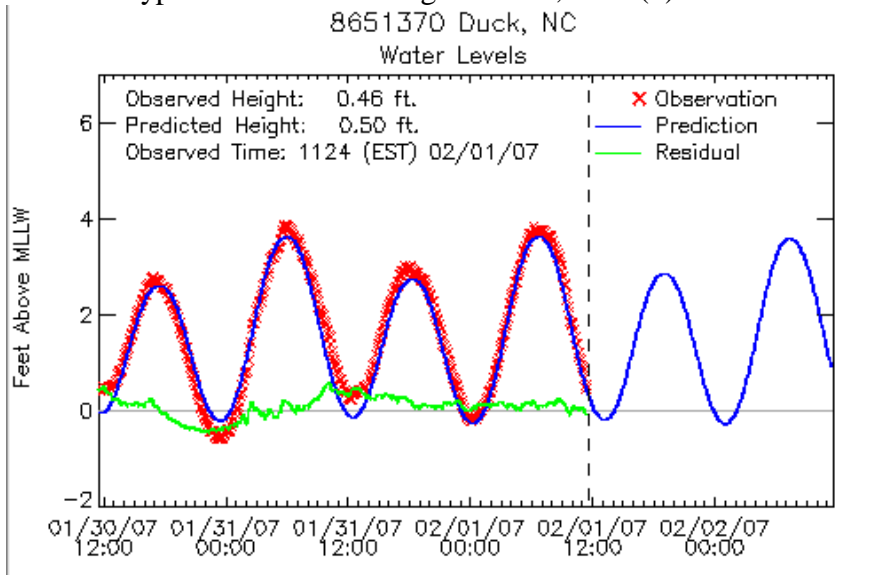
67. Where does the “salt” in seawater come from? (4)

68. What ion contributes the most to the salinity of seawater? (2)

69. What happens to the salinity of the Chesapeake Bay as you move closer to the Atlantic Ocean? (1)



70. What type of tide is occurring in Duck , NC? (2)



71. In the space below, draw the position of the sun and moon during a neap tide.(2)

