Exploring the World of Science

2020 - SSSS

Dynamic Planet

SCIOLY SUMMER STUDY SESSION

School Name: _____ Team Number: _____

Competitor(s): _____

_____

Directions:

- Please DO NOT open this exam until given direction to do so.

Rick would be disappointed if you gave up

Part I

Multiple Choice (1 pt each)

1. Which of these hold 2.15% of the world's saltwater :
    a. World Ocean
    b. Glaciers and Ice Caps
    c. Groundwater and soil moisture
    d. Water Vapor
2. What chemicals take up 85.4% of the ocean's ions:
    a. Chlorine and Sodium
    b. Chlorine and Salt
    c. Sodium and Sulfate
    d. Sodium and Magnesium
3. Higher salinity equals:
    a. Higher Density
    b. Lower Density
    c. Higher Temperature
    d. Lower Temperature
4. Salinity equals:
    a. Volume of salt times volume of water
    b. Volume of water divided by weight of salt
    c. Weight of salt divided by weight of water
    d. Temperature in °C times weight of salt
5. Which of these is a major source of salt for the ocean:
    a. Runoff from land
    b. Rain
    c. Hydrothermal Fluid
    d. A and C
6. Which of these decrease ocean salinity:
    a. Freezing seawater
    b. Erosion of rocks into the ocean
    c. Hydrothermal fluid
    d. Rain
7. Which value is ***within*** the correct range of density for water in the ocean:
    a. 1.013 g/cm^3
    b. 1.170 g/cm^3
    c. 1.053 g/cm^3
    d. 1.115 g/cm^3
8. Which value is ***within*** the correct range of salinity for water in the ocean **(in pph)**:
    a. 23‰
    b. 34‰
    c. 3.5%
    d. 2.7%

Part II

Fill in the Blank (1 pt each)

9. _____changes the heat of a substance but not its phase.

10. _____ changes the heat of a substance and its phase.

11. _____ is mainly generated by the radioactive decay of potassium, uranium, and thorium

12. _____ is re-emitted by the Earth after absorbing energy from the Sun

13. _____ is the process of energy going from warm to cooler objects.

14. _____ is emitted by the Sun as UV and visible light.

Part III

True or False (1pt each)

15. The layer of ocean with the most water is the surface ocean. _____

16. Depth is not the only factor for the temperature of water. _____

17. The surface ocean and the deep ocean are trading chemicals at a fast rate. _____

18. The thermocline is an index for measuring the temperature of the ocean. _____

19. The deep ocean can reach temperatures under zero degrees celsius and remain in a liquid state. _____

20. The deepest part of the ocean is known as Daredevil's Deep. _____

21. The deep ocean receives CO_2 from the atmosphere to support the sealife there. _____

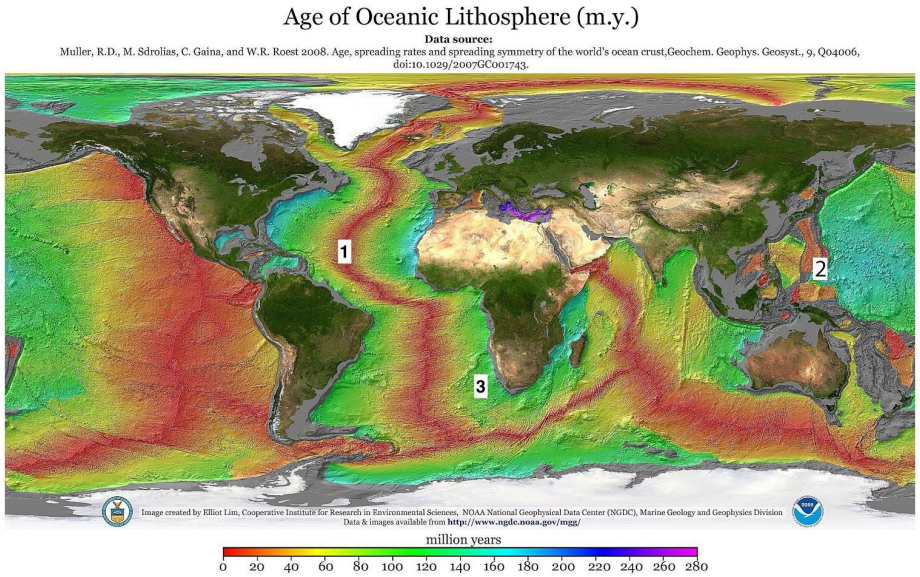
22. The atmosphere at sea level has a weight of 14.6 pounds. _____

23. Nitrogen narcosis is when increased pressure makes nitrogen and oxygen dissolve slower. _____

24. Pressure increases by one atm every 10 meters. _____

Part IV

Short Answer (2 pts each)



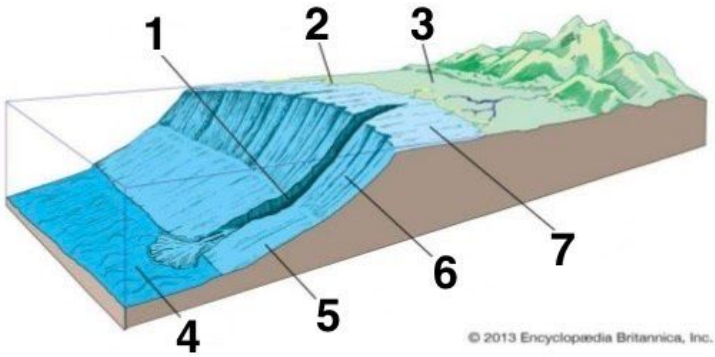
25. What is the topographic feature at marker 2? _____

26. What is the topographic feature at marker 1? _____

27. What is the age of the rock at marker 3? _____

28. Compare the age of the rock on marker 1 and marker 3. _____

_____



List the topographic features in this photo

Labeling (1 pt each)

29.

1. _____ 4. _____ 7. _____

2. _____ 5. _____

3. _____ 6. _____

Part V

Multiple Choice (1 pt each)

30. This is directly caused by a full or new moon:
    a. Neap tide
    b. Spring tide
    c. Ekman balance
    d. Deep ocean circulation
31. How long does it take for a semidiurnal tide to go from high to low?
    a. 12 hrs 25 minutes
    b. 3 hrs 14.5 minutes
    c. 24 hrs 50 minutes
    d. 6 hrs 12.5 minutes
32. What force drives tidal resonance?
    a. Gravitational pull of the Moon
    b. Wind
    c. Tides
    d. The Coriolis Effect
33. Which of these become stronger when the tides fall:
    a. 2
    b. Ebb current
    c. Gyres
    d. Flood current
34. Why is upwelling beneficial to fisheries?
    a. It pushes tropical fish north
    b. It keeps fish healthy by horizontally spreads nutrients throughout the ocean
    c. It distributes cool, deep ocean water to the surface ocean that has nutrients
    d. It pushes fish to the surface of the water
35. Rip currents usually break at the:
    a. Continental Slope
    b. Sandbar
    c. Trench
    d. Continental Shelf
36. Which of these create the energy for longshore currents:
    a. Tectonic Movement
    b. Wind
    c. Tides
    d. Breaking Waves
37. Why is there less upwelling during El Nino:
    a. Increase of the transition zone between surface and deep ocean
    b. Weak winds
    c. More trade winds
    d. A and B

Part VI

Short Answer (2 pts each)

38. How can an estuary gain a salinity very close to that of seawater? _____
_____
_____

39. Why doesn't the Equilibrium Tidal Theory work on Earth? _____
_____
_____

40. Why will a barrier reef on a sinking volcanic island eventually form a lagoon? _____
_____
_____

41. A geostrophic current is balanced because of the Coriolis Effect. Where is the one place it will not hold and why? _____
_____

42. How do eddies affect the ecosystem around them? _____
_____
_____

43. What happens to the water as you go from the top of the Ekman layer to the bottom of it? _____
_____
_____

44. Since deep ocean circulation is driven by differences in density, what causes these changes in density?
_____
_____
_____
_____

Part VII

Matching (1 pt each)

45. Wavelength	**A.** The depth that is affected by the orbital motion of the wave
46. Frequency	**B.** The maximum vertical displacement of the sea surface from half the wave height
47. Period	**C.** The speed at which the wave travels
48. Fetch	**D.** The time it takes for 2 successive crests to pass a given point
49. Wave base	**E.** The distance between two identical points
50. Celerity	**F.** The length a wind has blown across in a constant direction without obstruction
51. Swell	**G.** The number of waves that pass a point in a given amount of time
52. Amplitude	**H.** Collection of waves produced by storm winds

Short Answer (3 pts each)

53. A deep water wave has been spotted over the Pacific Ocean. Your partner informs you that half the distance between its crests is 18 meters. Find the speed of this wave.

54. You are on a school trip and want to prove your knowledge about waves. You see one travelling nearby. The captain on the ship tells you that it took 2 successive crests 0.2 minutes to pass a certain point. Find the frequency of the wave. (round to the nearest thousandth)

Part VIII

Short Answer (2 points each)

David, a fisherman in California, hears on the radio that there is a warming in sea surface temperatures across the central and east-central Equatorial Pacific. He wonders if this will affect his job of catching and selling squid. (base your answers on 1-3 on this)

55. What is this event called and does it affect his job? Why or why not? _____
_____
_____

56. If it does, what happens to the squid? If it doesn't, what other things might it affect? _____
_____
_____

57. Fishers off the eastern coast of South America aren't getting nearly as much fish as they normally do. Why is this happening? _____
_____
_____

58. What do you think will happen to the fish population after this event ends? _____
_____
_____
_____

Part IX

Definitions (1 point each)

59. Hydrometer: _____

60. Drill Boat: _____

61. Dredges: _____

62. Drogues: _____

63. SONAR: _____

Short Answer (2 points)

64. What is the difference between active SONAR and passive SONAR? _____
_____
_____

Part X

Short Answer (2 points each)

65. Your friend is a novice diver and is getting ready to go on a trip into the ocean. You remember a threat called nitrogen narcosis. Figure out at what psi nitrogen narcosis can occur. Round to the nearest whole number

66. You are part of an expedition group heading to a part of the open ocean in a submarine. Your group wants to travel to the boundary between the photic and aphotic zones. They look to you for help. Calculate the psi at this boundary and determine which two specific pelagic zones it correlates to. Round to the nearest whole number.

Fill in Blank (1 point each)

67. _____ are deposits caused by turbidity.

68. _____ are rocks carried off the land into the ocean.

69. _____ are shells and remains of organisms in the ocean.

70. _____ are chemicals that form outside of the ocean.

71. _____ are particles like dust from outer space.