

B - Dynamic Planet B - December 19 SO Practice - 12-19-2020

Good luck!

1. (2.00 pts) Which of the oceans is the largest?

- A) Atlantic Ocean
- B) Pacific Ocean
- C) Indian Ocean
- D) Southern Ocean
- E) Arctic Ocean

2. (3.00 pts) Select all of the following factors that would directly lead to a rise in eustatic sea level.

(Mark ALL correct answers)

- A) Melting of glaciers
- B) Melting of sea ice
- C) Rising ocean temperatures
- D) Faster rates of seafloor spreading
- E) Localized land subsidence

3. (2.00 pts)

Suppose that the horizontal surface area of the world's ocean basins increases by 10% due to tectonic processes. By about how many meters would sea level drop? If it helps, model the ocean as a rectangular box filled with water.

- A) 10 meters
- B) 50 meters
- C) 100 meters
- D) 300 meters
- E) 1000 meters

4. (2.00 pts)

After the sea level has fallen by this amount, suppose that thousands of years pass allowing for isostatic rebound. The density of the asthenosphere is 3.3 g/cm^3 . By how many meters does the elevation of the seafloor base rise relative to its original position?

- A) <10 meters
- B) 30 meters
- C) 60 meters
- D) 90 meters
- E) 150 meters
- F) 300 meters

5. (2.00 pts) The East Pacific Rise is an example of what type of plate boundary?

- A) Divergent Boundary
- B) Convergent Boundary
- C) Transform Boundary
- D) None of the above

6. (3.00 pts) Select all of the following that are characteristics of fast spreading centers (relative to slow spreading centers).

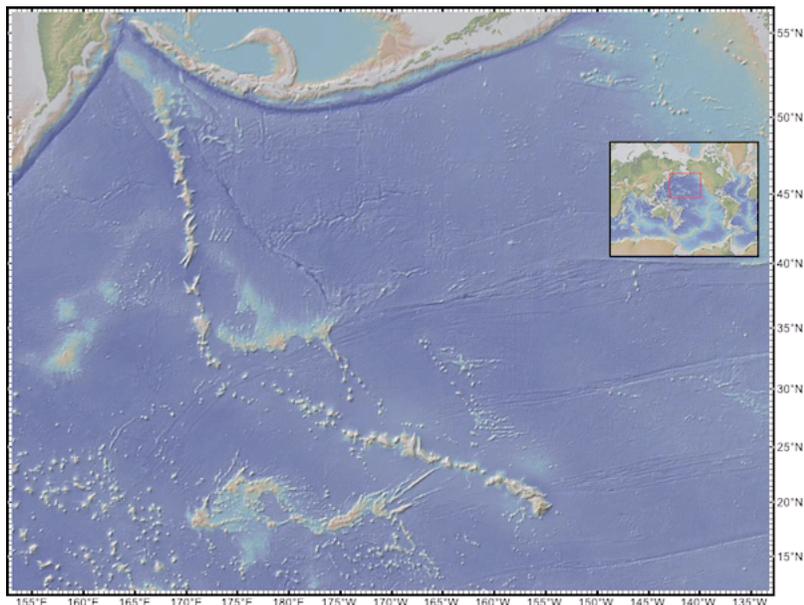
(Mark ALL correct answers)

- A) Lower volumes of seafloor production
- B) Smoother seafloor topography at the spreading center
- C) Lower elevations off the seafloor
- D) Smaller spacing between transform faults
- E) The presence of propagating rifts
- F) The presence of overlapping spreading centers

7. (2.00 pts) Which of the following is closest to the average periodicity of magnetic polarity reversals?

- A) 10,000 years
- B) 100,000 years
- C) 250,000 years
- D) 1,000,000 years

8. (2.00 pts) How was the bent linear feature shown in the image below formed?



- A) An oceanic-oceanic subduction zone led to the formation of a volcanic arc.
- B) An oceanic-continental subduction zone led to the formation of a volcanic arc.

- C) A volcanic hotspot shifted position over millions of years, creating a chain of hotspot-induced volcanic islands.
- D) A tectonic plate drifted over millions of years over a relatively immobile volcanic hotspot.
- E) A mid-ocean ridge produced a series of underwater mountains along a spreading center.

9. (3.00 pts) Select all of the following features that are not volcanic in origin.

(Mark ALL correct answers)

- A) Atolls
- B) Submarine Canyons
- C) Seamounts
- D) Guyots
- E) Continental Rises
- F) Island Arcs

10. (2.00 pts) In a juvenile ocean basin, which force is regarded to be the primary driver of plate motion?

- A) Slab pull
- B) Slab suction
- C) Ridge push

11. (2.00 pts) In a mature ocean basin, which force is regarded to be the primary driver of plate motion?

- A) Slab pull
- B) Slab suction
- C) Ridge push

12. (1.00 pts) It is possible for a mid-ocean ridge to be subducted beneath an overriding plate.

- True
- False

13. (1.00 pts) Hydrothermal vents can only form when there is a magma chamber beneath them.

- True
- False

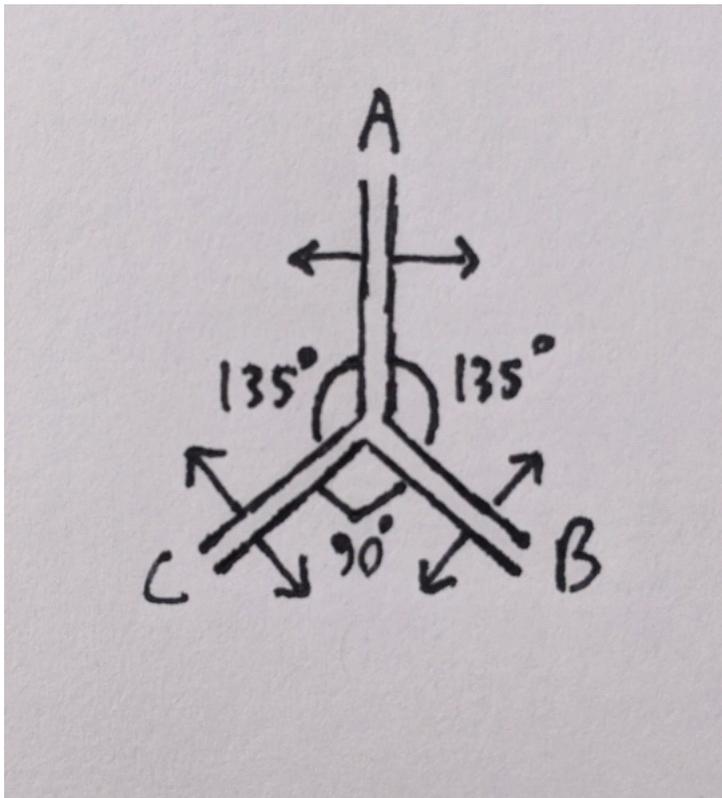
14. (1.00 pts) The first supercontinent was Pangaea.

- True
- False

15. (1.00 pts) Geothermal heat is the primary driving force of deep ocean circulation.

- True
- False

16. (2.00 pts) Spreading centers B and C spread orthogonally at rates of 5 cm/year. Determine the spreading rate of Ridge A.



- A) 2.5 cm/year
- B) 3.53 cm/year
- C) 5.00 cm/year
- D) 7.07 cm/year
- E) 10 cm/year
- F) 12.5 cm/year

17. (2.00 pts) Where is the primarily location for the deposition of turbidites?

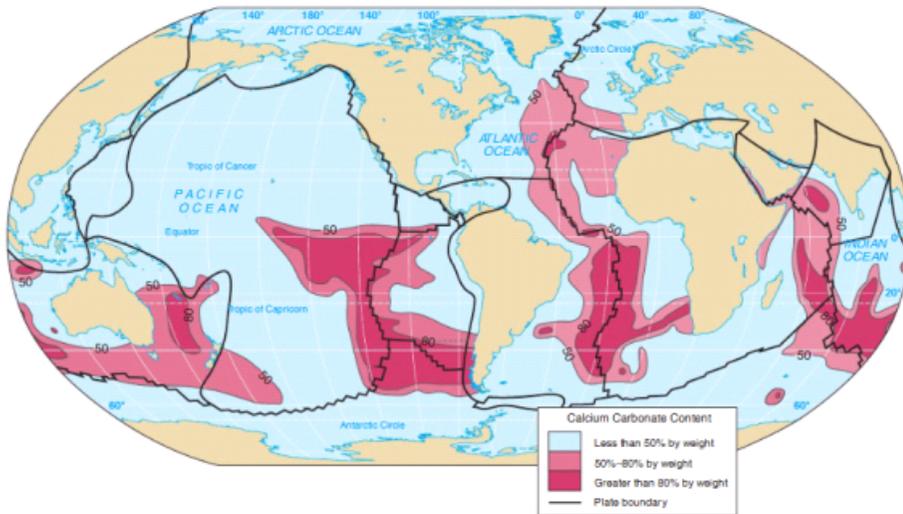
- A) Continental Shelf
- B) Continental Slope
- C) Continental Rise
- D) Abyssal Plain

18. (2.00 pts) What is the most abundant type of sediment found in the ocean?

- A) Cosmogenous
- B) Lithogenous
- C) Hydrogenous
- D) Biogenous

19. (2.00 pts)

Why does the global distribution of calcium carbonate in surface sediments shown below occur?



- A) Calcium ions are released from hydrothermal activity at the areas shown, causing calcium carbonate to precipitate.
- B) The areas shown have the most nutrients in surface waters, and so the most calcareous ooze is formed above the seafloor in those areas.
- C) The areas shown have the warmest surface waters, and so the most calcareous ooze is formed above the seafloor in those areas.
- D) Calcium carbonate tends to deposit in the areas shown because those areas are elevated above the Calcite Compensation Depth.

20. (2.00 pts) Select the precipitated material which is **incorrectly** matched to the main locations where it is found.

- A) Gypsum - Shallow restricted basins
- B) Oolites - Shallow waters at high latitudes
- C) Metal sulfides - Hydrothermal vents
- D) Manganese nodules - Abyssal plains
- E) Phosphate nodules - Continental shelves

21. (3.00 pts) Select all of the following microorganisms that are siliceous.

- (Mark **ALL** correct answers)
- A) Coccolithophores
 - B) Radiolarians
 - C) Diatoms

D) Foraminifera

22. (3.00 pts) Select all of the following ions that are major components of seawater (i.e. more than 100 ppm).

(Mark **ALL** correct answers)

- A) Cl⁻
 B) PO₄²⁻
 C) SO₄²⁻
 D) Ca²⁺
 E) NO₃⁻
 F) NH₄⁺

23. (3.00 pts) Select the two most common ions in river water.

(Mark **ALL** correct answers)

- A) Cl⁻
 B) Ca²⁺
 C) NO₃⁻
 D) K⁺
 E) HCO₃⁻
 F) Na⁺

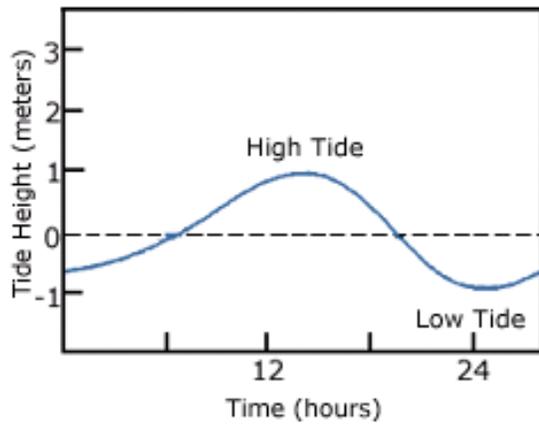
24. (2.00 pts) What is the original source of chloride dissolved in the ocean?

- A) Continental weathering
 B) Hydrothermal venting
 C) Volcanic outgassing
 D) Asteroid impacts

25. (2.00 pts) How will the overall pH of the ocean change due to industrial activity?

- A) Increase
 B) Decrease
 C) No change

26. (2.00 pts) What type of tidal pattern is shown?



- A) Diurnal
- B) Semidiurnal
- C) Mixed Semidiurnal

27. (2.00 pts) Where do internal waves occur?

- A) On the surface of the ocean
- B) Perpendicular to isopycnal surfaces
- C) Along sharp pycnoclines
- D) In the interior of water masses with constant density
- E) Along the ocean floor

28. (2.00 pts) Which of the following configurations would lead to the largest tidal amplitude?

- A) The Earth, Moon, and Sun in syzygy during aphelion.
- B) The Earth, Moon, and Sun in syzygy during perihelion.
- C) The Earth, Moon, and Sun in syzygy during perigee.
- D) The Earth, Moon, and Sun in quadrature during perihelion.
- E) The Earth, Moon, and Sun in quadrature during perigee.
- F) The Earth, Moon, and Sun in quadrature during apogee.

29. (1.00 pts) Cotidal lines are lines of equal tidal amplitude.

- True
- False

30. (1.00 pts) All tidal currents will have a slack water at some point in their cycle.

- True
- False

31. (1.00 pts) Tidal bulges behave as shallow water waves.

- True False

32. (1.00 pts) Tidal currents are density-driven.

- True False

33. (2.00 pts) Ocean gyres in the Northern Hemisphere demonstrate _____ rotation. (Note: *all* ocean gyres in the Northern Hemisphere are included)

- A) Clockwise
 B) Counterclockwise
 C) Almost no
 D) Both directions of

34. (2.00 pts) At what temperature does ocean water have a maximum of density?

- A) The boiling point
 B) 4 degrees C
 C) 0 degrees C
 D) -0.1 degrees C
 E) The freezing point

35. (2.00 pts) What type of wave are waves at the surface of the ocean?

- A) Longitudinal waves
 B) Transverse waves
 C) Both of the above
 D) Neither of the above

36. (2.00 pts) How is the wave speed of a deep water wave affected by the period of the wave?

- A) Wave speed is directly proportional to period
 B) Wave speed is proportional to the square root of period
 C) Wave speed is inversely proportional to period
 D) Wave speed is inversely proportional to the square root of period
 E) Wave speed is independent of period

37. (2.00 pts) Of the following options, when and where does a thermocline occur at greatest depth?

- A) At tropical latitudes, in the summer
 B) At tropical latitudes, in the winter
 C) At middle latitudes, in the summer

- D) At middle latitudes, in the winter
- E) At polar latitudes, in the summer
- F) At polar latitudes, in the winter

38. (2.00 pts) A pycnocline is a sharp depth gradient in _____.

- A) Density
- B) Oxygen Concentration
- C) Salinity
- D) Temperature
- E) Turbidity
- F) pH

39. (3.00 pts) Select all of the following water masses whose formations involve the formation of sea ice.

(Mark ALL correct answers)

- A) North Atlantic Deep Water
- B) Antarctic Intermediate Water
- C) Antarctic Bottom Water
- D) Circumpolar Deep Water
- E) Arctic Intermediate Water
- F) Subantarctic Mode Water

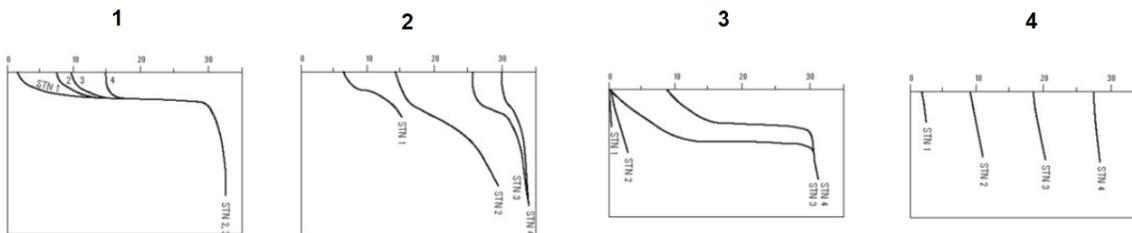
40. (3.00 pts) Select all of the following properties which are stable and conservative tracers for ocean water masses.

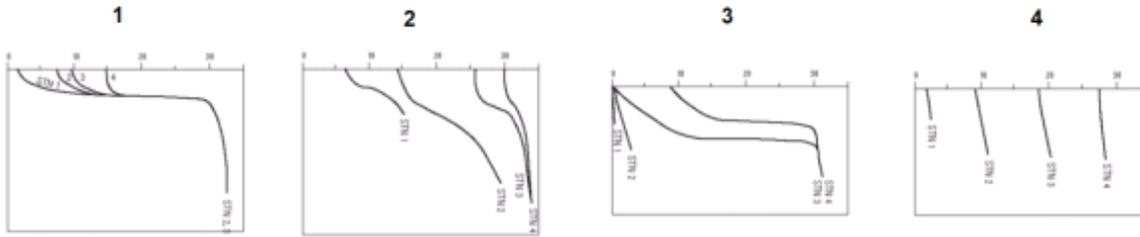
(Mark ALL correct answers)

- A) Salinity
- B) O₂ concentration
- C) CO₂ concentration
- D) Helium-3 concentration
- E) Tritium concentration
- F) Sulfur Hexafluoride concentration

41. (2.00 pts)

Match the estuary types to the salinity profiles shown below (ignore that 2 may show up in your browser)





- A) 1: partially-mixed, 2: fjord-type, 3: salt-wedge, 4: well-mixed
- B) 1: well-mixed, 2: salt-wedge, 3: partially-mixed, 4: fjord-type
- C) 1: fjord-type, 2: partially-mixed, 3: salt-wedge, 4: well-mixed
- D) 1: well-mixed, 2: partially-mixed, 3: salt-wedge, 4: fjord-type
- E) 1: salt-wedge, 2: partially-mixed, 3: fjord-type, 4: well-mixed
- F) 1: fjord-type, 2: partially-mixed, 3: well-mixed, 4: salt-wedge

42. (2.00 pts) Identify the coastal feature shown below.



- A) Wave-cut platform
- B) Barrier Island
- C) Marine terraces
- D) Spit

43. (2.00 pts)

Identify the coastal feature shown below.



- A) Undertow
- B) Longshore bar
- C) Rip current
- D) Berm

44. (2.00 pts) Identify the oceanic feature shown below.



- A) Atoll
- B) Island arc
- C) Continental shelf
- D) Carbonate platform

45. (1.00 pts) Summer storms are more intense than winter storms.

- True
- False

46. (1.00 pts) Longshore drift transports sediment in the same direction as the adjacent ocean gyre current.

- True
- False

47. (1.00 pts) Increasing pressure on water raises its temperature.

- True
- False

48. (1.00 pts) Fjords are generally well-mixed.

- True
- False

49. (1.00 pts) Equatorial waters have lower salinity than tropical waters.

- True
- False

50. (1.00 pts) Salinity decreases with depth at high latitudes.

- True False

51. (2.00 pts) Rank the following ocean waves from longest to shortest wavelength.

- A) Tides, Wind Waves, Tsunamis, Seiches
 B) Tides, Tsunamis, Seiches, Wind Waves
 C) Seiches, Tsunamis, Wind Waves, Tides
 D) Tsunamis, Seiches, Tides, Wind Waves
 E) Seiches, Wind Waves, Tides, Tsunamis

52. (3.00 pts) Select all of the following which are forms of hard stabilization.

(Mark ALL correct answers)

- A) Groins
 B) Sandbars
 C) Seawalls
 D) Beach nourishment
 E) Barrier Islands
 F) Jetties

53. (3.00 pts) Select all of the following which are characteristics of oceanic crust.

(Mark ALL correct answers)

- A) Becomes thicker as it ages
 B) Thinner than continental crust
 C) More felsic than continental crust
 D) Denser than continental crust
 E) Generally older than continental crust

54. (2.00 pts) In the open ocean, wind waves with a wavelength of 120 meters are observed. What is their wave speed?

- A) 3.5 m/s
 B) 10.2 m/s
 C) 13.7 m/s
 D) 18.9 m/s
 E) 60 m/s

55. (2.00 pts) A tsunami moving into the continental shelf with a depth of 55 meters has what wave speed?

- A) 3.4 m/s
 B) 13.7 m/s

- C) 18.5 m/s
- D) 23.2 m/s
- E) 45.0 m/s
- F) 114 m/s

56. (3.00 pts) Select all of the following which are common characteristics of erosional coastlines.

(Mark **ALL** correct answers)

- A) More rugged topography than depositional coastlines
- B) Tectonically active
- C) Greater sediment maturity than depositional coastlines
- D) More well-developed rivers than depositional coastlines
- E) Formed longer ago than depositional coastlines

57. (3.00 pts) Select all of the following features which can be associated with convergent boundaries.

(Mark **ALL** correct answers)

- A) Trenches
- B) Volcanic arcs
- C) Decompression melting
- D) Normal faulting
- E) Deep earthquakes

58. (3.00 pts) Select all of the following that are characteristics of a La Niña event.

(Mark **ALL** correct answers)

- A) An intensification of trade winds
- B) Commonly occurs shortly before El Niño events
- C) Droughts in South America
- D) Droughts in Indonesia
- E) Intensified upwelling off the coast of South America
- F) A stronger equatorial countercurrent

59. (2.00 pts) Why is the moon's effect on ocean tides about twice as strong as the sun's effect on tides?

- A) The moon rotates around the Earth faster than the Earth rotates around the sun.
- B) The moon is much less massive than the sun.
- C) The moon is much closer to the Earth than the sun.
- D) The Earth and the moon are tidally locked.
- E) The moon is haunted.

60. (2.00 pts) How would local sea level be affected by the presence of a cyclonic system overhead?

- A) It would cause an increase in sea level due to lowered atmospheric pressure.

- B) It would cause a decrease in sea level due to increased atmospheric pressure.
- C) It would cause an increase in sea level due to increased precipitation rates.
- D) It would cause a decrease in sea level due to increased evaporation rates.

Thank you for competing! If you have any questions about this test, feel free to contact the event supervisor at ryan.a.anselm@gmail.com
