

## Section 1 Fall 2018

### True/False

*Indicate whether the statement is true or false.*

- \_\_\_ 1. Because of the dissolved salt in seawater its freezing point is lower than that of pure water
- \_\_\_ 2. Salinity is used to determine the density of sea water
- \_\_\_ 3. Marquet's principle states that "regardless of how the salinity may vary from place to place the ratios between the amounts of the major ions in the waters of the open ocean are nearly constant"
- \_\_\_ 4. It doesn't matter what the salinity of the seawater is -- you can always make it dense enough to form deep water if you cool it enough
- \_\_\_ 5. Hydrothermal vents always have large numbers of animals around them
- \_\_\_ 6. Hydrothermal vents are found only at mid-ocean ridges.
- \_\_\_ 7. Hydrothermal vents can be found by high concentrations of manganese in the water.
- \_\_\_ 8. Nitrate, phosphate, carbon and calcium are required nutrients
- \_\_\_ 9. All of the nitrate in the ocean comes from rivers
- \_\_\_ 10. There is more phosphate in the deep water of the Pacific Ocean than in the deep water of the Atlantic Ocean
- \_\_\_ 11. Tritium is a chemical that can be used to trace the physical movement of water in the oceans
- \_\_\_ 12. There are only two places in the ocean where deep water is currently made
- \_\_\_ 13. Dry air is more dense than humid air
- \_\_\_ 14. Deserts are found at the latitudes where air masses are rising
- \_\_\_ 15. Surface currents are driven by atmospheric processes
- \_\_\_ 16. Gyres in the Southern hemisphere are anticlockwise
- \_\_\_ 17. During El Nino conditions hurricanes are less likely to come near Hawaii
- \_\_\_ 18. Wave packets travel more slowly than individual waves
- \_\_\_ 19. The speed of a shallow water wave is related to its period
- \_\_\_ 20. Shoaling decreases the height of a wave

### Multiple Choice

*Identify the choice that best completes the statement or answers the question.*

- \_\_\_ 21. How much salt is dissolved in a kilogram of typical seawater
  - a. 1gram
  - b. 15 grams
  - c. 35 grams
  - d. 0.1 gram

- \_\_\_\_\_ 22. The presence of dissolved chemicals in sea water is important for:
- allowing life to exist in the sea
  - the regulation of the climate of the earth
  - altering the freezing point of seawater
  - all of the above
- \_\_\_\_\_ 23. What is the approximate mixing time of the oceans?
- 100 years
  - 1,000 years
  - 36,000 years
  - 1 million years
- \_\_\_\_\_ 24. Major ions in sea water have residence times:
- greater than 1 million years
  - equal to 1,000 years
  - less than 1million years
  - more than 100 million years
- \_\_\_\_\_ 25. Hydrothermal fluids result from the reaction of sea water with high temperature magma below the bottom of the sea-floor. How deep can these fluids go:
- 10 m
  - 1 km
  - 5 km
  - 100km
- \_\_\_\_\_ 26. The chemosynthetic based communities at hydrothermal vent sites get their energy ultimately from:
- Sulphide
  - Sunlight
  - Warmth of the water
  - Radioactive decay
  - Twinkie bars
- \_\_\_\_\_ 27. What is the pressure at the depth of a typical hydrothermal vent site?
- 50 atmospheres
  - 150 atmospheres
  - 250 atmospheres
  - 500 atmospheres
- \_\_\_\_\_ 28. Which of the following chemicals is most likely to be the limiting nutrient in the surface waters of the ocean?
- calcium
  - silicon
  - phosphorous
  - carbon
  - cadmium
- \_\_\_\_\_ 29. Nutrients are removed from the surface waters of the ocean down to the point where the light level is
- 50%
  - 10%
  - 5%
  - 1%

- \_\_\_\_\_ 30. The heat capacity of a substance is the amount of heat needed to raise its temperature by
- 1°C
  - 10°C
  - 15°C
  - 100°C
- \_\_\_\_\_ 31. The thermohaline circulation is
- the process that moves deep water from the Atlantic to the Pacific Ocean
  - the process by which organisms remove chemicals in surface waters and remobilise them in deep water
  - the process which brings hydrothermal fluids to the sea floor
  - a new transport system at San Francisco airport
- \_\_\_\_\_ 32. The thermocline is the part of the ocean where
- the density changes rapidly
  - salinity changes rapidly
  - the temperature changes rapidly
  - you are most likely to find Elvis
- \_\_\_\_\_ 33. At the latitude of Hawaii in the Pacific Ocean there is:
- net evaporation
  - net precipitation
  - they are equal
- \_\_\_\_\_ 34. The colour of light that is absorbed least in the ocean is
- violet
  - blue
  - green
  - red
- \_\_\_\_\_ 35. In water the speed of sound
- increases with decreasing temperature
  - increases with increasing pressure
  - all of the above
  - none of the above
- \_\_\_\_\_ 36. On average how much heat (watts per square metre) is reaching the surface of the Earth and oceans in the tropics?
- 10
  - 50
  - 100
  - 170
- \_\_\_\_\_ 37. Approximately what % of incoming light reaches 10 m depth
- 1%
  - 6%
  - 16%
  - 46%
- \_\_\_\_\_ 38. The wavelength of the radiation entering and leaving the Earth are
- the same
  - incoming is short, outgoing is long
  - incoming is long, outgoing is short
  - none of the above

- \_\_\_\_\_ 39. The mass of one square inch of the atmosphere at the Earth's surface is approximately
- 5 pounds
  - 1 pound
  - 15 pounds
  - 25 pounds
  - 10 pounds
- \_\_\_\_\_ 40. The atmospheric pressure at the top of Mauna Kea is approximately
- 1000 mb
  - 829 mb
  - 562 mb
  - 213 mb
- \_\_\_\_\_ 41. Western boundary currents are:
- slower than eastern boundary currents
  - colder than eastern boundary currents
  - all of the above
  - none of the above
- \_\_\_\_\_ 42. At the equator the Earth is rotating eastward at approximately:
- 100 mph
  - 10,000 mph
  - 1,000 mph
  - 1,500 mph
- \_\_\_\_\_ 43. Effective transport in the Ekman layer in the northern hemisphere relative to the wind is
- 20° to the left
  - 90° to the left
  - 15° to the right
  - 45° to the right
  - directly ahead
- \_\_\_\_\_ 44. In the movie we saw in class, during the 1982/3 El Nino which area was affected by many typhoons?
- Australia
  - French Polynesia
  - India
  - Japan
- \_\_\_\_\_ 45. The southern oscillation is:
- the change in direction of Coriolis force at the equator
  - the change in pressure differential between Darwin and Tahiti
  - the change in the thermocline depth between El Nino and La Nina
  - A popular dance from Brazil
- \_\_\_\_\_ 46. During El Nino conditions the surface waters of the eastern Pacific are:
- colder than normal
  - warmer than normal
  - more productive than normal
  - drier than normal
- \_\_\_\_\_ 47. Typical tidal range in Hawaii is
- 15ft
  - 3ft
  - 10ft
  - 50ft

- \_\_\_\_\_ 48. As a result of tides the length of a day on Earth is:
- increasing
  - decreasing
  - not changing
- \_\_\_\_\_ 49. In the Pacific Ocean, Tsunami travel at approximately:
- 13 mph
  - 45 mph
  - 150 mph
  - 450 mph
- \_\_\_\_\_ 50. Spring tides occur when:
- the moon is one quarter
  - the Sun and Moon are aligned with the Earth
  - Jupiter is aligned with Mars
  - none of the above
- \_\_\_\_\_ 51. Each day high tide is approximately:
- 1 hour later
  - 1 hour earlier
  - 2 hours later
  - exactly the same time
- \_\_\_\_\_ 52. There are two Spring tides every
- day
  - 7 days
  - 14 days
  - 28 days
- \_\_\_\_\_ 53. If a wind wave has a period of 12 seconds its velocity in meters per second in deep water would be approximately:
- 8
  - 12
  - 18
  - 36
- \_\_\_\_\_ 54. When wave trains propagate away from a storm they lose what percentage of their height each day?
- 10%
  - 50%
  - 30%
  - 22%
- \_\_\_\_\_ 55. During the movie clip we watched in class about the Hokulea, what was the purpose of observing the directions of the waves in the surface ocean
- Predict the arrival of a nearby storm
  - Identify the presence of nearby islands
  - Maintain the direction of the canoe's travel
  - All of the above
- \_\_\_\_\_ 56. When a deep water wave approaches the shore which of the following is true:
- its velocity remains constant
  - its period remains constant
  - its wavelength remains constant
  - all of the above

Name: \_\_\_\_\_

ID: A

- \_\_\_\_\_ 57. The current CO<sub>2</sub> content of the atmosphere (in ppmv) is about:
- a. 120
  - b. 240
  - c. 400
  - d. 560
- \_\_\_\_\_ 58. If we were to burn all the fossil fuels and all the organic carbon in sediments we could, in principle, increase atmospheric CO<sub>2</sub> levels by:
- a. 2-times
  - b. 6- times
  - c. 13- times
  - d. 20- times
  - e. 50- times
- \_\_\_\_\_ 59. The Vostock ice core was drilled by French and Soviet scientists in
- a. France
  - b. Greenland
  - c. Siberia
  - d. Antarctica
  - e. Alaska
- \_\_\_\_\_ 60. During an ice age sea level
- a. goes up
  - b. goes down
  - c. stays the same

### Completion

*Complete each statement.*

61. Three mechanisms by which heat can be transferred are: \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
62. The two forces that raise the tides on the surface of the Earth are \_\_\_\_\_ and \_\_\_\_\_.
63. Name two ways in which large storms can lose the energy which feed their growth \_\_\_\_\_ and \_\_\_\_\_.

Name: \_\_\_\_\_

ID: A

**Essay**

64. Draw a picture that shows what happens to 100 units of primary production in the ocean. Label the amounts of material at each depth in the ocean and sediments

65. Name four chemicals that are needed by all oceanic plants and two that are needed by some organisms that build skeletons