

B - Water Quality - Pearl City Invitational - 12-12-2020

Welcome to Water Quality

1. (1.00 pts) Part 1

What is the dominant control on water circulation in a salt wedge estuary?

- ☒ A) river discharge
- ☐ B) ocean tides
- ☐ C) saline groundwater discharge
- ☐ D) diversion of water from river for agricultural use

2. (1.00 pts) pH was measured continuously in the photic zone of a stratified estuary.

At 3 pm the pH was 8.9

At 4 am the pH was 7.2

Which two process occurred at 3 pm then 4am might explain this difference?

- ☐ A) Respiration then photosynthesis
- ☐ B) Denitrification then ammonification
- ☒ C) Photosynthesis then respiration
- ☐ D) Oxidation then reduction

3. (1.00 pts) Where would you expect to find the turbidity maximum zone in an estuary?

- ☐ A) At the furthest inland part of the tidal reach
- ☐ B) Near the ocean side of the estuary
- ☒ C) Near the region where fresh and salt water meet
- ☐ D) Most estuaries have consistent turbidity

4. (1.00 pts) What are zooxanthellae?

- ☐ A) Free swimming diatoms that coral polyps eat
- ☐ B) A zooplankton that derives its energy from sulfide oxidation
- ☐ C) A diatom that lives in the polyp and supplies food for the coral
- ☒ D) A dinoflagellate that lives in the polyp and supplies food for the coral

5. (1.00 pts) The equatorial currents in the Pacific Ocean flow in what direction?

- ☒ A) From East to West
- ☐ B) From West to East

- ☐ C) From North to South
- ☐ D) from South to North

6. (1.00 pts) Which of the following statements is true?

- ☐ A) Energy cycles and nutrients cycle
- ☐ B) Energy cycles and nutrients flow in one direction
- ☒ C) Energy flows in one direction and nutrients cycle
- ☐ D) Energy and nutrients flow in one direction

7. (1.00 pts) Which of the following biological processes is NOT linked to the nitrogen cycle?

- ☐ A) Assimilation by plants
- ☐ B) Denitrification
- ☐ C) Nitrification
- ☒ D) Infiltration

8. (1.00 pts) What is a watershed?

- ☐ A) Reservoir of water underground, containing a supply of groundwater
- ☐ B) Extensive wetlands leading to an estuary
- ☐ C) A series of streams and rivers that lead to a larger body of water
- ☒ D) An area of land where water from rain or melting ice converges into a larger body of water

9. (1.00 pts) What is the purpose of coagulation during water treatment?

- ☐ A) Remove large objects for water treatment
- ☐ B) Collect sediments deposited at the bottom
- ☒ C) Remove suspended solids
- ☐ D) Remove positively charged ions

10. (1.00 pts) What property of water explains its high specific heat?

- ☐ A) High viscosity
- ☐ B) High enthalpy of vaporization
- ☐ C) Crystal lattice structure
- ☒ D) Hydrogen bonding

11. (1.00 pts) What is detritus?

- ☐ A) An autotroph
- ☐ B) A carnivore

- ☒ C) Organic matter
- ☐ D) Nektons

12. (1.00 pts) The 5 ocean garbage patches includes all of the following EXCEPT

- ☐ A) North Pacific
- ☒ B) Central Pacific
- ☐ C) North Atlantic
- ☐ D) Indian

13. (1.00 pts) Algal blooms can cause all of the following EXCEPT

- ☐ A) Less light available to aquatic life
- ☒ B) Decreased surface water temperature
- ☐ C) Less dissolved oxygen
- ☐ D) Increased toxin levels

14. (1.00 pts) What kind of estuary is Chesapeake Bay?

- ☒ A) Salt-wedge
- ☐ B) Fjord
- ☐ C) Vertically mixed
- ☐ D) Partially mixed

15. (1.00 pts) Movement of ground water is called

- ☒ A) Percolation
- ☐ B) Infiltration
- ☐ C) Evaporation
- ☐ D) Transpiration

16. (1.00 pts) Watersheds affect all of the following EXCEPT

- ☐ A) Flooding
- ☐ B) Water quality
- ☒ C) Point source pollution
- ☐ D) Stream and wetland habitats

17. (1.00 pts) The carbon, nitrogen and phosphorus cycle have many common elements. Which of the following is NOT in all 3 cycles?

- ☐ A) Exchange of gas with the atmosphere
- ☐ B) Detritus feeding
- ☐ C) Oxidation

- ☒ D) Respiration

18. (1.00 pts) Nitrification includes the conversion of

- ☐ A) Nitrogen to ammonia
☐ B) Nitrites to ammonia
☒ C) Nitrites to nitrates
☐ D) Nitrates to nitrogen

19. (1.00 pts) Which of the following pairs are equivalent trophic levels?

- ☒ A) Second order consumer, first order carnivore
☐ B) First order consumer, first order carnivore
☐ C) Third order consumer, first order carnivore
☐ D) Herbivore, second order consumer

20. (1.00 pts) Carnivores retain what percent of energy of the producers?

- ☐ A) 100%
☐ B) 10%
☒ C) 1%
☐ D) 0.1%

21. (1.00 pts) Estuary water circulation is affected by

- ☐ A) Coriolis effect
☐ B) Wind patterns
☐ C) Tides
☒ D) All of the above

22. (1.00 pts) Density of water depends on

- ☐ A) Salinity
☐ B) Temperature
☐ C) pH
☒ D) A and B

23. (1.00 pts) Which of the following is NOT part of primary treatment of sewage?

- ☐ A) Physical removal of large particles
☐ B) Sedimentation
☐ C) Filtration

- ☒ D) Aeration

24. (1.00 pts) Which of the following is a point source of pollution?

- ☒ A) Hot water from a power plant
☐ B) Run-off from roads
☐ C) Fertilizer run-off from farms
☐ D) Decomposition of algal blooms

25. (1.00 pts) Contain trees that can survive high salinity with roots that form maze along tree bases

- ☐ A) kelp forest
☐ B) rocky shorelines and bottoms
☒ C) mangroves
☐ D) mudflats
☐ E) barrier beaches
☐ F) deepwater swamps

26. (1.00 pts) Because of pounding waves and shifting sands, microscopic and larger animals adapt to life under sand

- ☐ A) kelp forest
☐ B) rocky shorelines and bottoms
☐ C) mangroves
☐ D) mudflats
☒ E) barrier beaches
☐ F) deepwater swamps

27. (1.00 pts) Composed of fine sediments; composed of benthic zone exposed at low tide

- ☐ A) kelp forest
☐ B) rocky shorelines and bottoms
☐ C) mangroves
☒ D) mudflats
☐ E) barrier beaches
☐ F) deepwater swamps

28. (1.00 pts) May have high waves and strong winds, along west and northeast coasts

- ☐ A) kelp forest
☒ B) rocky shorelines and bottoms
☐ C) mangroves
☐ D) mudflats
☐ E) barrier beaches

- ☐ F) deepwater swamps

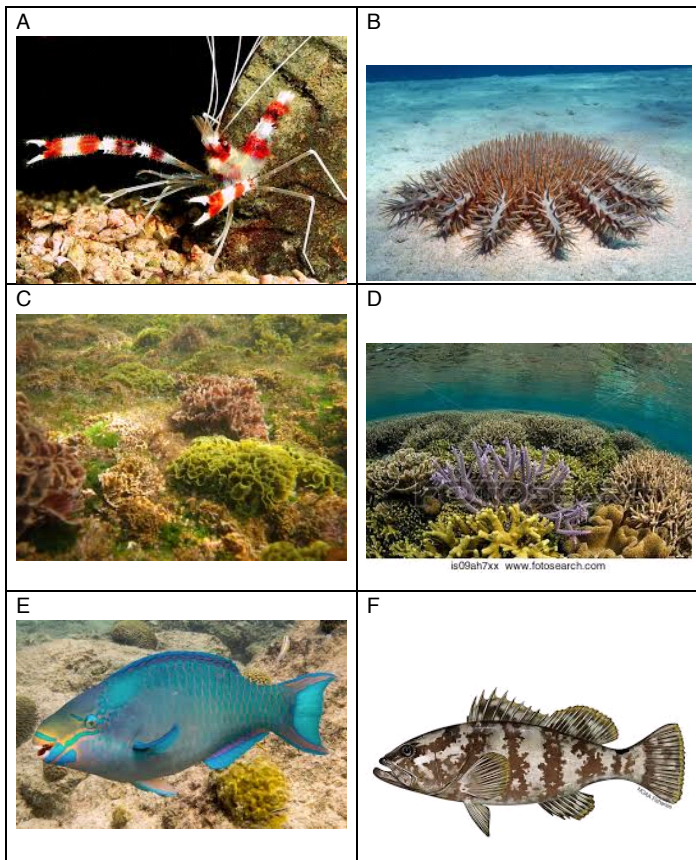
29. (1.00 pts) Flooded forested wetlands; near edges of lakes and rivers, survives prolonged flooding

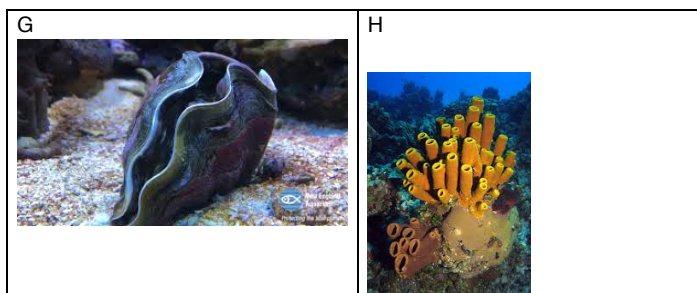
- ☐ A) kelp forest
☐ B) rocky shorelines and bottoms
☐ C) mangroves
☐ D) mudflats
☐ E) barrier beaches
☒ F) deepwater swamps

30. (1.00 pts) Occur in cold, nutrient-rich, shallow, clear, open coastal waters

- ☒ A) kelp forest
☐ B) rocky shorelines and bottoms
☐ C) mangroves
☐ D) mudflats
☐ E) barrier beaches
☐ F) deepwater swamps

Part 2





Use This chart to answer questions below. Use common names for identification of organism. Use letter on chart to answer questions 39-45.

31. (1.00 pts) Identify organism A ____

Banded coral shrimp

32. (1.00 pts) Identify organism B ____

Crown of thorns starfish

33. (1.00 pts) Identify organism C ____

Fleshy algae

34. (1.00 pts) Identify organism D ____

Hard coral

35. (1.00 pts) Identify organism E ____

Parrotfish

36. (1.00 pts) Identify Organism F ____

Nassau grouper

37. (1.00 pts) Identify Organism G ____

Giant clam

38. (1.00 pts) Identify Organism H ____

Sponge

39. (1.00 pts) Which of these organisms is/are found in the Indo Pacific region?

40. (1.00 pts) Which of these defecate sand as they digest their food?

41. (1.00 pts) Which of these compete with coral for floor space?

42. (1.00 pts) Which organism is the top carnivore on the chart?

43. (1.00 pts) Which organism swallows its prey whole using suction?

44. (1.00 pts) Which organism practices monogamous mating?

45. (1.00 pts) Which organism is an indicator for curio collection?

46. (1.00 pts) What type of symbiotic relationship might organism A have with organism E? "A" can be found swimming in the gills of "E".

Expected Answer: mutualism

47. (1.00 pts) What is the symbiotic relationship between organism B and D?

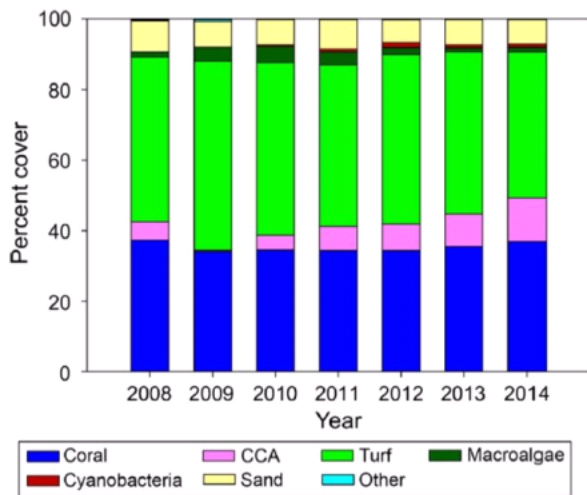
Expected Answer: predation

48. (2.00 pts) List 2 organisms that live in a mutualistic relationship with algae.

Expected Answer: coral, giant clams, sponge

49. (2.00 pts) Which of these organisms is/are simultaneous hermaphrodite(s)?

Expected Answer: giant clam, sponge, coral



Use this graph to answer the next 3 questions. A ban on herbivore fishing was made in 2010.

50. (1.00 pts) What effect did the ban have on the amount of macroalgae?

Expected Answer: decrease

51. (2.00 pts) How should the change in macroalgae affect coral growth? Why?

Expected Answer: coral growth increase; less competition for floor space, not covered--more sunlight

52. (2.00 pts) Why is the change in coral growth NOT significant?

Expected Answer: coral grows slowly

53. (1.00 pts) Coral reefs are made up of ____ % of all marine fish species.

25

54. (2.00 pts) Zooxanthellae provide coral polyps with what 2 essential substances?

Expected Answer: oxygen and nutrients (food)

55. (1.00 pts)

What type of reef is this?



Expected Answer: fringing

Part 3

56. (1.00 pts) Fecal coliform concentrations are reported in the number of bacterial colonies per

☐ A) 1 mL of water

- ☐ B) 10 mL of water
- ☒ C) 100 mL of water
- ☐ D) L of water

57. (1.00 pts) The optimal pH range for aquatic organisms is approximately:

- ☐ A) 4.5 - 7
- ☐ B) 5.5 - 9.5
- ☒ C) 6.5 - 8.5
- ☐ D) 7.0 - 7.5

58. (1.00 pts) Which of the following is NOT a suspended solid?

- ☒ A) Bicarbonate
- ☐ B) Silt
- ☐ C) Clay
- ☐ D) Plankton

59. (1.00 pts) Turbidity can be measured with

- ☐ A) Electronic monitor
- ☐ B) Secchi disc
- ☒ C) A and B
- ☐ D) Ultrasound

60. (1.00 pts) Biochemical Oxygen Demand (BOD) with a value less than 5 ppm

- ☒ A) is rich in dissolved oxygen
- ☐ B) poor in dissolved oxygen
- ☐ C) highly polluted
- ☐ D) B and C

61. (1.00 pts) A solution has a pH of 6. The pH is decreased to 4. By what factor did the concentration of hydrogen ions change?

- ☐ A) .01
- ☐ B) 2
- ☐ C) 10
- ☒ D) 100

62. (1.00 pts) When BOD increases, what happens to dissolved oxygen?

- ☐ A) Increases

- ☒ B) Decreases
- ☐ C) Stays the same
- ☐ D) Depends on temperature

63. (1.00 pts) Photosynthesis causes water pH to

- ☒ A) Become more alkaline
- ☐ B) Become more acidic
- ☐ C) To neutralize
- ☐ D) Remain the same

64. (1.00 pts) What unit is used in measuring turbidity?

- ☐ A) mg/L
- ☐ B) nitrate turbidity units
- ☐ C) parts per million
- ☒ D) nephelometric turbidity units

65. (1.00 pts) Which of the following indicates high levels of phosphates in water?

- ☐ A) Presence of large fish
- ☒ B) Algal blooms
- ☐ C) High Secchi reading
- ☐ D) High DO

66. (1.00 pts) Why are phosphates essential to living things?

- ☒ A) They are an important part of nucleic acids
- ☐ B) They are found in carbohydrates
- ☐ C) They are an important part of fats
- ☐ D) They aid in transpiration

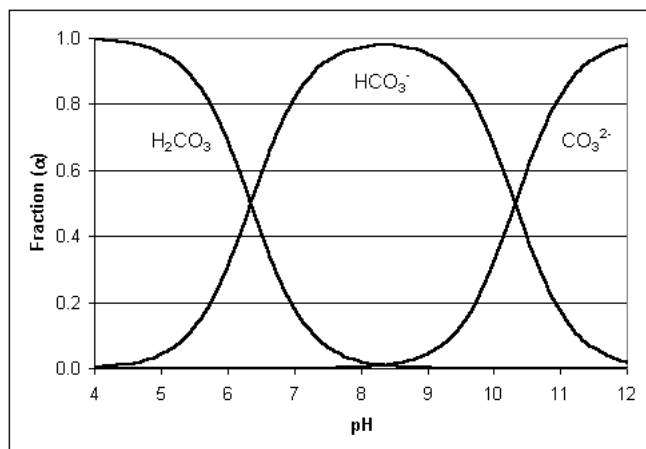
67. (1.00 pts) The Redfield Ratio describes the ratio of the following in oceans

- ☐ A) Carbon to nitrogen ratio
- ☐ B) Carbon to phosphorus ratio
- ☐ C) Nitrogen to phosphorus ratio
- ☒ D) Carbon to nitrogen to phosphorus ratio

68. (1.00 pts) Dissolved oxygen levels below which of the following would kill large fish?

- ☐ A) 20 - 25 ppm
- ☐ B) 12 - 15 ppm

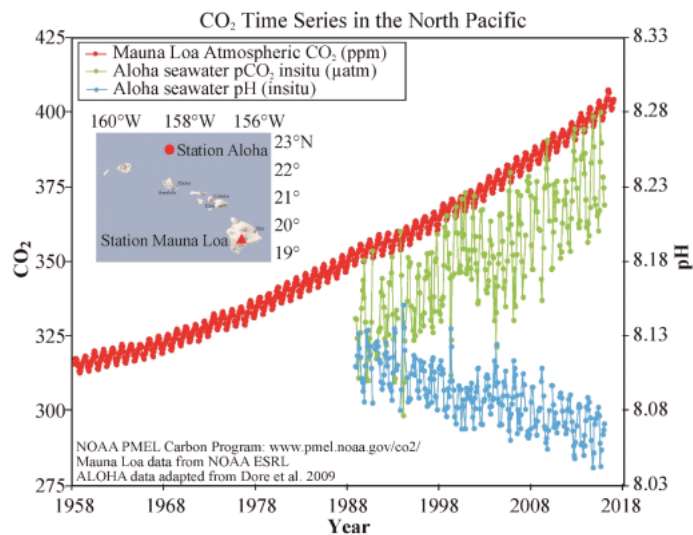
- ☐ C) 7 - 8 ppm
- ☒ D) 1 - 2 ppm



Use this graph to answer the question below.

69. (1.00 pts) At what pH are the concentrations of bicarbonate and carbonate ions equal?

- ☐ A) 4
- ☐ B) 6.25
- ☒ C) 10.25
- ☐ D) 12



Use this graph to answer question below.

70. (1.00 pts) According to the data above, what effects did increased atmospheric carbon dioxide have on dissolved carbon dioxide and ocean pH?

- ☐ A) Dissolved carbon dioxide and pH have increased
- ☐ B) Dissolved carbon dioxide and pH have decreased

- ☐ C) Dissolved carbon dioxide has decreased and pH has increased
- ☒ D) Dissolved carbon dioxide has increased and pH has decreased.

71. (1.00 pts) Air pollution is responsible for ___ of toxic contaminants and nutrients that enter coastal areas and oceans

- ☐ A) 1/10
- ☐ B) 1/4
- ☒ C) 1/3
- ☐ D) 1/2

72. (1.00 pts) What test uses the pH scale?

- ☒ A) Acidity
- ☐ B) Turbidity
- ☐ C) Hardness
- ☐ D) Dissolved oxygen
- ☐ E) Salinity

73. (1.00 pts) Which is caused by suspended particles?

- ☐ A) Acidity
- ☒ B) Turbidity
- ☐ C) Hardness
- ☐ D) Dissolved oxygen
- ☐ E) Salinity

74. (1.00 pts) Which is decreased by the breakdown of organic waste?

- ☐ A) Acidity
- ☐ B) Turbidity
- ☐ C) Hardness
- ☒ D) Dissolved oxygen
- ☐ E) Salinity

75. (1.00 pts) Which is measured by the amount of Ca^{2+} and Mg^{2+} ?

- ☐ A) Acidity
- ☐ B) Turbidity
- ☒ C) Hardness
- ☐ D) Dissolved oxygen
- ☐ E) Salinity

76. (1.00 pts) Using ocean water, a salinometer would float _____ compared to distilled water.

- ☒ A) Higher
- ☐ B) Lower
- ☐ C) Same level
- ☐ D) Depends on temperature of water

77. (1.00 pts) What process can you use to separate suspended solids from dissolved solids?

Expected Answer: filtration

78. (2.00 pts) Raising water temperature ____ decomposition rate of organic matter in water and ____ the amount of dissolved oxygen

increases

decreases

79. (1.00 pts) What level of aragonite saturation is optimal for coral reef growth?

Expected Answer: greater than 4 omega

80. (5.00 pts) What impact does the introduction of increased levels of nitrates and phosphates have on the water chemistry?

Expected Answer: Increased algal growth basis for changes; decreased DO, increased pH, increased BOD, increased suspended solids, increased temperature, increased turbidity, increased total solids; need to mention 5 for full credit