

Chapter 13 Questions

1. Photosynthesis converts _____ into _____.
 - a) food ... energy
 - b) carbon dioxide and oxygen ... water and carbohydrate
 - c) sulfate and carbohydrate ... water and hydrogen sulfide
 - d) carbon dioxide and water ... oxygen and carbohydrate
 - e) carbon dioxide and hydrogen sulfide ... sulfate and carbohydrate
2. Chemosynthesis converts _____ into _____.
 - a) food ... energy
 - b) carbon dioxide and oxygen ... water and carbohydrate
 - c) sulfate and carbohydrate ... water and hydrogen sulfide
 - d) carbon dioxide and water ... oxygen and carbohydrate
 - e) carbon dioxide and hydrogen sulfide ... sulfate and carbohydrate
3. Primary productivity is defined as _____ and is measured in units of _____.
 - a) the synthesis of organic material by primary consumers ... $\text{gC/m}^2/\text{yr}$.
 - b) the synthesis of organic material by primary producers ... $\text{gC/m}^2/\text{yr}$.
 - c) the synthesis of organic material by primary consumers ... gC/yr .
 - d) the synthesis of organic material by primary producers ... gC/yr .
 - e) the synthesis of inorganic nutrients like nitrate ... g/yr .
4. Which of the following is true about marine primary producers vs. terrestrial primary producers?
 - a) The total primary productivity of the land is about 10 times that of the sea.
 - b) The total primary productivity of the land is about 1/10 that of the sea.
 - c) The total primary productivity of the land and sea are more-or-less the same, but the total producer biomass on land is hundreds of times higher than that of the sea.
 - d) The total primary productivity of the land and sea are more-or-less the same, but the total producer biomass in the sea is hundreds of times higher than that of the land.
5. A garden where the plants are big, but are growing very slowly has
 - a) low primary productivity and low biomass.
 - b) low primary productivity and high biomass.
 - c) high primary productivity and low biomass.
 - d) high primary productivity and high biomass.
6. Rank the following ocean environments from lowest to highest primary productivity:
 - a) Coral reef, kelp forest, open ocean.
 - b) Coral reef, open ocean, kelp forest.
 - c) Kelp forest, coral reef, open ocean.
 - d) Kelp forest, open ocean, coral reef.
 - e) Open ocean, kelp forest, coral reef.

Chapter 14 Questions

7. The term plankton refers to plants and animals that
 - a) drift more-or-less passively with the currents of the sea.
 - b) are found attached to planks and logs floating in the ocean.
 - c) consume pirates that have been made to walk the plank (sharks and saltwater crocodiles are examples).
 - d) can swim horizontally against the current, but never vertically.
 - e) are attached to the seafloor.

8. The main difference between phytoplankton and zooplankton is
- zooplankton are plankton found in the zoo whereas phytoplankton are wild plankton.
 - phytoplankton (also called fido-plankton) are embryonic dogfish whereas zooplankton are plankton found in the zoo.
 - phytoplankton are autotrophs whereas zooplankton are heterotrophs.
 - phytoplankton can grow to be 10 m in diameter, whereas zooplankton stay smaller than 1 cm diameter.
 - phytoplankton (also known as fighter-plankton) are vicious little animals, whereas zooplankton are mellow cow-like organisms.
9. The various groups of phytoplankton include
- copepods and krill.
 - viruses and bacteria.
 - jelly fish and arrow worms.
 - dinoflagellates and diatoms.
 - deep-sea creatures like angler-fish.
10. The term *picoplankton* refers to
- large planktonic organisms like jellyfish that may account for most of the photosynthetic activity in parts of the open ocean.
 - large planktonic organisms like jellyfish that probably do not contribute much photosynthetic activity in the open ocean.
 - tiny planktonic organisms like cyanobacteria that may account for most of the photosynthetic activity in parts of the open ocean.
 - tiny planktonic organisms like cyanobacteria that probably do not contribute much photosynthetic activity in the open ocean.
 - an informal term for any planktonic organism (pick-a-plankton).
11. A diatom is characterized by
- flagella, possible bioluminescence, and a cell wall made of silica.
 - flagella, possible bioluminescence, and a cell wall made of cellulose.
 - flagella, possible bioluminescence, and a cell wall made of calcium carbonate (CaCO_3).
 - fatty acids and oils in the cell, and a cell wall made of silica.
12. A planktonic diatom counters the weight of its frustule by
- constantly swimming up towards the surface.
 - lying on the bottom.
 - storing fats and oils that are less dense than water.
 - storing a bubble of oxygen in the frustule.
13. A dinoflagellate is characterized by
- flagella, possible bioluminescence, and a cell wall made of silica.
 - flagella, possible bioluminescence, and a cell wall made of cellulose.
 - flagella, possible bioluminescence, and a cell wall made of calcium carbonate (CaCO_3).
 - fatty acids and oils in the cell, and a cell wall made of silica.
14. Red tides and harmful algal blooms (HABs) are caused by
- diatoms.
 - dinoflagellates.
 - the Al Qaeda.
 - pelagic red crabs.
 - grunions.

15. The two main limiting factors for marine primary productivity are
- limited nutrients and excessive consumption by herbivores.
 - limited light and excessive consumption by herbivores.
 - disease and excessive consumption by herbivores
 - limited nutrients and limited light.
 - disease and limited nutrients.
16. Averaged over the entire year, where is overall primary productivity highest in the open ocean?
- In the tropics.
 - In temperate zones.
 - In polar regions.
 - It varies from year to year, so it is impossible to say.
 - It is about the same in the tropics, the temperate zones, and the polar regions.
17. Phytoplankton biomass reaches a peak about April or May in northern temperate waters in an event called the *spring bloom*. This is caused by
- an increase in sunlight combined with high levels of nutrients left over from deep mixing by winter storms.
 - a decrease in the herbivore population.
 - a lack of interest in eating on the part of the herbivores owing to an increase in reproductive activity.
 - an increase in sunlight combined with a decrease in the herbivore population.
18. Marine zooplankton are composed of
- nothing but crustaceans.
 - nothing but jellyfish.
 - nothing but crustaceans and jellyfish.
 - representatives from just about every major animal phylum.
 - diatoms.
19. The term *algae* refers specifically to
- single-celled autotrophs.
 - multi-celled autotrophs.
 - autotrophs lacking a vascular system in which to conduct water and nutrients.
 - autotrophs with a vascular system in which to conduct water and nutrients.
 - any organism, whether autotrophic or heterotrophic, with a vascular system.
20. Accessory pigments in marine autotrophs
- help photosynthesis in deep water by absorbing blue light and transferring the energy to chlorophyll molecules.
 - protect the organisms from sunburn.
 - make the organisms impossible to detect by marine herbivores.
 - are used in the production of colored purses, scarves, and other accessories.
 - help the autotrophs to float, keeping them in the photic zone.
21. The group of marine seaweeds having the greatest range in depth (from the surface to such depths where it is very hard for humans to see) is
- the red algae (Phylum Rhodophyta).
 - the green algae (Phylum Chlorophyta).
 - the diatoms (Phylum Pyrrophyta).
 - the golden algae (Phylum Chrysophyta)
 - the brown algae (Phylum Phaeophyta).

22. *Macrocystis*, a genus of giant kelp found close to shore in California and elsewhere, is
- closely related to redwood trees.
 - closely related to sea grass.
 - closely related to mangroves.
 - a form of brown algae.
 - a type of phytoplankton.
23. Marine angiosperms
- have holdfasts and gas bladders, and include giant kelp and mangroves.
 - have roots and vascular systems, and include giant kelp and mangroves.
 - have flowers and vascular systems, and include surf grass and mangroves.
 - have holdfasts and gas bladders, and include surf grass and mangroves.
 - have flowers but no vascular systems, and include giant kelp and surf grass.
24. Sketch a few stages of diatom cell division. What happens to the average size of the valves? How does the diatom deal with this problem? Note: cell division is *asexual reproduction*, whereas auxospore formation requires sexual reproduction (2 diatoms getting together). What advantages does sexual reproduction give that asexual reproduction does not? What advantages does asexual reproduction confer? The answer to this is not in the text, but here's a hint: asexual reproduction produces clones.
25. Sketch a giant kelp, including the holdfast, stipes, blades, and gas bladders. Explain the purpose of each structure.
26. Explain why marine autotrophs can generate so much primary productivity with so little biomass, compared to terrestrial autotrophs.
27. Your grandmother has heard of plankton. Tell her what plankton are.