Supplemental Test Items to accompany OpenStax College *Concepts of Biology*. Note that not all chapters of OpenStax College *Concepts of Biology* have accompanying test items. Building on the community-oriented nature of OpenStax College resources, we invite you to submit items to be considered for future inclusion.

**Chapter 20: Ecosystems and the Biosphere**

1. Which of the following correctly identifies an abiotic factor influencing the distribution of biomes? (Outcome #7a) (DOK 1)
2. the amount and type of bacteria present in a given patch of soil
3. the total number of plant-eating insects in a given space
4. elevation of a land mass above sea level\*
5. Bodies of fresh water undergo a process called turnover, which typically happens in the spring and in the fall. Which of the following best explains this phenomenon? (Outcome #7a) (DOK 2) (Paired Item 1)
6. Water is most dense at 4 degrees Celsius, a temperature it reaches on the surface in the spring and in the fall, and it sinks to the bottom.\*
7. When ice forms or melts, it causes currents to flow laterally, stirring up the water in the entire body.
8. Ice forms and sinks to the bottom because it is heavier than water; this pushes bottom water upward.
9. Which of the following best describes spring turnover? (Outcome #7a) (DOK 2) (Paired Item 2)
10. As ice on the surface of a body of water melts, it reaches 4 degrees Celcius, the temperature at which water is most dense, and it sinks to the bottom, pushing deeper water toward the surface.\*
11. Water at the surfaces of water bodies warms along with air temperatures, and new life begins to grow in the warmer water.
12. Fallen leaves from the previous season begin to deteriorate and provide nutrients for new members of ground-dwelling animals and fungi.
13. Which two terrestrial biomes are most likely to exist adjacent to one another? (Outcome #7a) (DOK 2)
14. (a) periods of little or no rainfall with widely fluctuating daily ambient temperatures and (b) permanently frozen soil layer that prevents deep roots
15. (a) rich biodiversity but poor soils and (b) primarily deciduous trees with seasonal droughts\*
16. (a) rough, scrubby areas along coastlines and (b) primarily grass-covered with very few trees
17. What on Earth is an ecosystem? (Outcome #7c) (DOK 1)
18. An ecosystem is the physical features of various parts of the globe that support life.
19. An ecosystem is a community of living organisms and their interactions with their abiotic environment.\*
20. An ecosystem is the biological component of any given zone or region of the planet’s surface.
21. What are the three primary ecosystem types? (Outcome #7c) (DOK 1)
22. marine, freshwater, and terrestrial\*
23. desert, forest, grassland
24. ocean, coastal, inland
25. What is a foundation species? (Outcome #7c) (DOK 1) (Paired Item 1)
26. A foundation species is one that can safely disappear once the ecosystem is established.
27. A foundation species is one that first colonized an ecosystem and slowly made the environment hospitable for other species.
28. A foundation species is one that exerts the greatest influence on the overall structure of an ecosystem.\*
29. Trees in a hardwood forest are an example of what? (Outcome #7c) (DOK 1) (Paired Item 2)
30. a pioneer species
31. a keystone species
32. a foundation species\*
33. What is the key difference between a foundation species and a keystone species in a given ecosystem? (Outcome #7c) (DOK 1)
34. A foundation species exerts the most influence on maintaining biodiversity while a keystone species is most abundant.
35. A foundation species is usually the most abundant, and a keystone species exerts the most influence on maintaining biodiversity.\*
36. There is no difference—the terms are used interchangeably.
37. After a disturbance such as a wildfire, an ecosystem will undergo changes until it reaches a state of equilibrium similar to its pre-disturbance state. The ecosystem is said to have reached what? (Outcome #7c) (DOK 1)
38. primary succession
39. mutualism
40. climax community\*
41. Logistic population growth patterns are indicative of what? (Outcome #7c) (DOK 1) (Paired Item 1)
42. limited resources\*
43. unlimited resources
44. a disruption of carrying capacity
45. Limited resources in a habitat exert an effect on population growth that is best represented by \_\_\_\_\_\_\_\_. (Outcome #7c) (DOK 1) (Paired Item 2)
46. logistic modeling\*
47. exponential modeling
48. linear modeling
49. Bees are important pollinators of flowering plants. When bees are abundant in an ecosystem, flowering plants reproduce more successfully. More flowering plants mean more food and shelter for primary consumers. Bees are what kind of species? (Outcome #7c) (DOK 2)
50. pioneer
51. foundational
52. keystone\*
53. The trophic level transfer efficiency (TLTE) is defined as the product of 100 and the quotient of production at the trophic level of interest and the trophic level one position lower. If the primary producers in a particular ecosystem provide 5000 kcal/m2/yr and the primary consumers in this ecosystem produce 1000 kcal/m2/yr, what is the TLTE for these two trophic levels in this ecosystem? (Outcome #7c) (DOK 2) (Paired Item 1)
54. 5%
55. 20%\*
56. 400%
57. The trophic level transfer efficiency (TLTE) is defined as the product of 100 and the quotient of production at the trophic level of interest and the trophic level one position lower. If the TLTE between primary producers in a particular ecosystem who provide 5000 kcal/m2/yr and the primary consumers in this ecosystem is 20%, what is the energy produced by the primary consumers? (Outcome #7c) (DOK 2) (Paired Item 2)
58. 1000 kcal/m2/yr\*
59. 2500 kcal/m2/yr
60. 25,000 kcal/m2/yr
61. Net production efficiency (NPE) is defined as the product of 100 and the quotient of net consumer productivity and assimilation. If the invertebrate primary consumers of an ecosystem exhibit a NPE of about 20% and pass on about 1000 kcal/m2/yr to secondary consumers, what is the assimilation of the primary consumers? (Outcome #7c) (DOK 2)
62. 1000 kcal/m2/yr
63. 2000 kcal/m2/yr
64. 5000 kcal/m2/yr\*
65. Choose the best explanation for how human population growth adversely affects biodiversity. (Outcome #7c) (DOK 2)
66. man-made global warming, maintaining preserves, native habitat restoration
67. habitat remodeling, principle of scarcity, and endemic species
68. habitat loss, tragedy of the commons, and exotic species\*
69. Plants require nitrogen for life, but only certain forms of soil nitrogen are accessible to most plants. Which forms are directly useful to plants, and from where do these come? (Outcome #7c) (DOK 3) (Paired Item 1)
70. NH4+ and NO3- from ammonification to form ammonium cations and nitrification to form nitrate anions\*
71. N2 and organic nitrogen (nitrogen bound to carbon-based molecules) from denitrification to form molecular nitrogen and biosynthesis to form organic nitrogen
72. NO2- from nitrification to form nitrite anions
73. Nitrogen is an essential element for plants, and most plants can only use certain forms of nitrogen. What are these forms and how do they become available in the soil? (Outcome #7c) (DOK 3) (Paired Item 2)
74. Ammonification produces ammonia (NH3); nitrification produces molecular nitrogen (N2)
75. Ammonification produces ammonium ion (NH4+); nitrification produces nitrate (NO3)\*
76. Ammonification produces ammonium ion (NH3+); denitrification produces nitrite (NO2-)
77. The structure of the reef ecosystem is actually made from the skeletons of: (Outcome #8) (DOK 1)
78. coral\*
79. fish
80. sharks
81. Which type of biome is characterized by very little rainfall? (Outcome #8) (DOK 1)
82. tundra
83. savannah
84. desert\*