1. A student set up a small freshwater fish tank. The tank included water, fish, gravel, a snail, and plants, as represented below.

Which statement best describes an activity performed by a student investigating an abiotic factor using this setup?

a. He records the temperature of the water.
b. He feeds the fish 0.5 gram of fish food twice a day.
c. He measures the growth of the plants with a metric ruler.
d. He observes the snail scrape algae off the gravel.

2. Which sequence best represents the flow of energy through an ecosystem?

a. Sun → green plants → herbivores → carnivores
b. Sun → herbivores → producers → consumers
c. green plants → carnivores → consumers → herbivores
d. consumers → carnivores → herbivores → producers

3. An ecosystem is self-sustaining as long as organisms have sufficient quantities of energy, oxygen, minerals, and water. When organisms die, some of these materials are recycled back to plants in the ecosystem primarily through the activity of

a. predators
b. decomposers
c. pathogens
d. parasites

4. The chart below lists substances involved in the process of photosynthesis.

<table>
<thead>
<tr>
<th>Substance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>glucose</td>
</tr>
<tr>
<td>B</td>
<td>oxygen</td>
</tr>
<tr>
<td>C</td>
<td>carbon dioxide</td>
</tr>
<tr>
<td>D</td>
<td>water</td>
</tr>
</tbody>
</table>

Which statement best describes how these substances interact in photosynthesis?

a. A and B combine to produce C and D.
b. B and C combine to produce A and D.
c. C and D combine to produce A and B.
d. A and C combine to produce B and D.

5. A food web is represented below.

Which organism would receive the least amount of transferred solar energy?

a. grasses
b. owls
c. frogs
d. field mice
6. The flow of energy in an ecosystem is best described as energy moving in
   a. one direction from the Sun to the producers and then to the consumers
   b. one direction from a consumer to a producer and then to the Sun as heat and light
   c. two directions between the producers that are present
   d. two directions, back and forth, between the producers and the consumers

7. Which process uses energy to combine inorganic molecules to synthesize organic molecules?
   a. respiration
   b. digestion
   c. photosynthesis
   d. decomposition

8. The diagram below represents different feeding levels in an energy pyramid.

   The most likely explanation for showing fewer organisms at each feeding level going up the pyramid is that
   a. some energy is lost to the environment as heat
   b. the larger the organism, the less energy it requires
   c. some energy is recycled within each level and remains there
   d. decomposers convert most of the energy into inorganic compounds

9. Decomposers are necessary in a food chain because they
   a. manufacture food by photosynthesis
   b. return nutrients to the ecosystem
   c. absorb energy from the Sun
   d. produce organic nutrients
10. Base your answer to the question on the energy pyramid below and on your knowledge of biology.

Letter A in the pyramid represents

a. scavengers  
b. producers  
c. carnivores  
d. herbivores
Base your answer to the question on the diagram below and on your knowledge of biology. The diagram represents a food web.

11. **Refer to figure 1**
What do the arrows in the diagram represent?
   a. an increase in population  
   b. the evolution of organisms  
   c. the flow of energy  
   d. ecological succession

12. Autotrophs might survive when heterotrophs cannot, because autotrophs are able to  
   a. reproduce asexually  
   b. become dormant  
   c. exist without respiration  
   d. make their own food

13. The increase of certain types of gases in the atmosphere has contributed to the problem of global warming. All these gases are  
   a. biotic factors  
   b. abiotic factors  
   c. organic factors  
   d. endangered factors
The diagram shows a food chain.

14. [Refer to figure 2]

What is the role of the bacteria in this food chain?

a. producer
b. decomposer
c. consumer
The diagram shows a food web found in a tundra.

15. [Refer to figure 3]
How many different producers are found in this food web?
   a. five
   b. two
   c. three
   d. four

16. A fundamental concept of ecology is that living organisms
   a. are independent and do not interact with each other or
      with the physical environment
   b. do not interact with other living organisms, but do
      interact with the physical environment
   c. interact with each other, but do not interact with the
      physical environment
   d. interact with other living organisms and interact with the
      physical environment
17. Air is necessary for all living organisms to survive. Which gas in air is necessary for photosynthesis, a process in which plants make their own food?
   a. nitrogen
   b. oxygen
   c. carbon dioxide
   d. water vapor

18. What is the name of the pigment found in green plants that is needed for photosynthesis?
   a. chloroplast
   b. cholesterol
   c. chrysalis
   d. chlorophyll