

**Biology Test 2 – BIO.2c-d: Metabolic Processes**

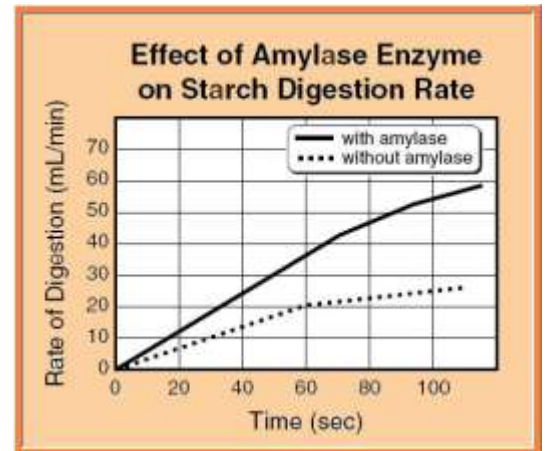
For questions 1 – 16, choose the best answer. Indicate your answer on the Scantron and on the test.

1. Scientists hypothesize that oxygen began to accumulate in Earth’s atmosphere after the appearance of living things with the ability to —

- a. breathe air
- b. photosynthesize
- c. reproduce sexually
- d. form tissues

2. According to the graph at right, addition of the enzyme amylase causes the reaction to —

- a. slow down
- b. speed up
- c. take in heat
- d. give off heat



3. Enzymes only work with specific substrates because each substrate —

- a. actively interferes with other substrates around it
- b. destroys its specific enzyme
- c. can only use a specific ionic bond with the enzyme
- d. fits in the specific active site of an enzyme for attachment

4. Which of these processes is carried out in the same way in both plants and animals?

- a. Digestion
- b. Circulation of body fluids
- c. Photosynthesis
- d. Cellular respiration

5. The process of photosynthesis ultimately converts light energy into —

- a. mechanical energy
- b. nuclear energy
- c. chemical energy
- d. electrical energy

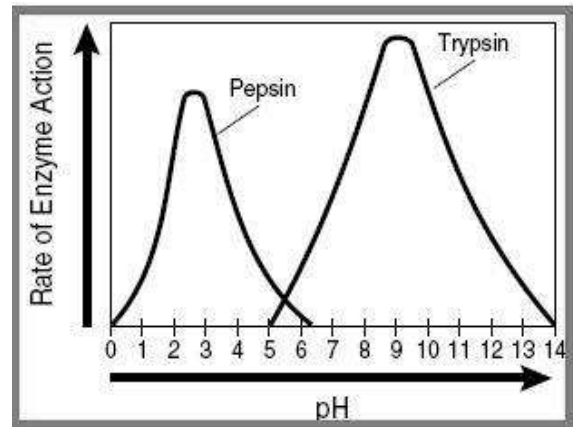
6. Algae and multicellular plants are photoautotrophs because they —

- a. absorb nutrients from soil
- b. capture sunlight to produce sugars
- c. break down starches to glucose
- d. decompose dead organisms

7. The energy in the food produced by autotrophs or taken into the bodies of heterotrophs must be changed into a form that cells can use. The energy molecule used by cells is —
- CO<sub>2</sub>
  - RNA
  - ATP
  - DNA

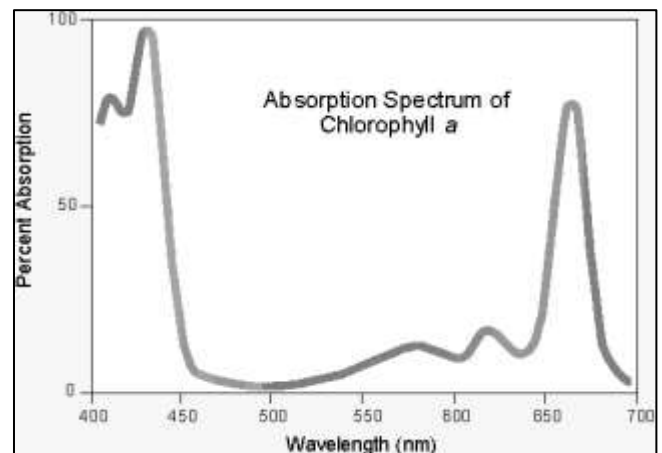
8. Which is required by all living things?
- Oxygen
  - Energy
  - Mobility
  - Carbon dioxide

9. This graph shows that —
- more enzymes are present at a higher pH
  - pepsin is less sensitive to pH than trypsin
  - pepsin is less effective at low pH than trypsin
  - pH affects the activity rate of enzymes



10. Which of the following is most effective in helping rain forest plants trap sunlight so that light energy can be converted to chemical energy?
- Large root size
  - Small seed size
  - Large leaf size
  - Small stem

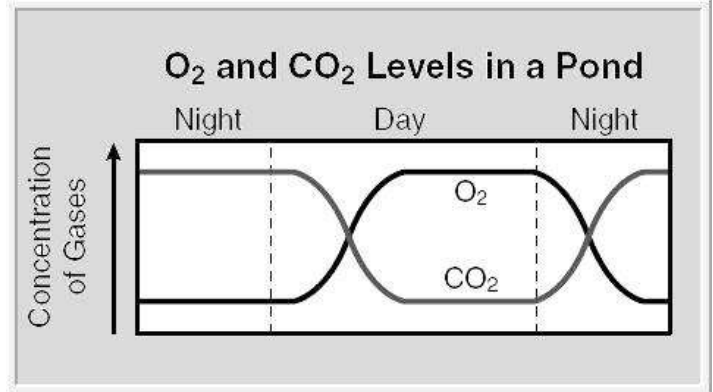
11. According to the graph at right, which of the following is a valid conclusion?
- Chlorophyll a is capable of absorbing light at multiple wavelengths.
  - Plants will only perform photosynthesis under natural blue light.
  - Plants that appear blue or red perform photosynthesis the fastest.
  - The optimum wavelength of light for photosynthesis is 500 nm.



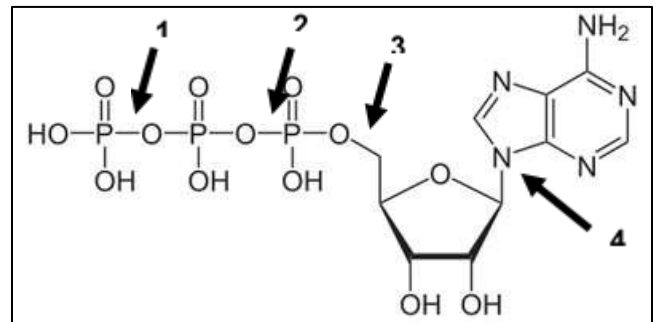
12. Unlike plants, fungi cannot make their own food because they do not have —
- spores
  - roots
  - chlorophyll
  - hyphae

13. In the human body, muscle cells have an increased need for energy during exercise. To help supply this energy, the body will immediately increase —
- food intake to increase the substances available for respiration
  - activity in the nervous system to stimulate intake of carbon dioxide
  - the need for waste products to be retained
  - the breathing rate to supply more oxygen to cells for the release of energy

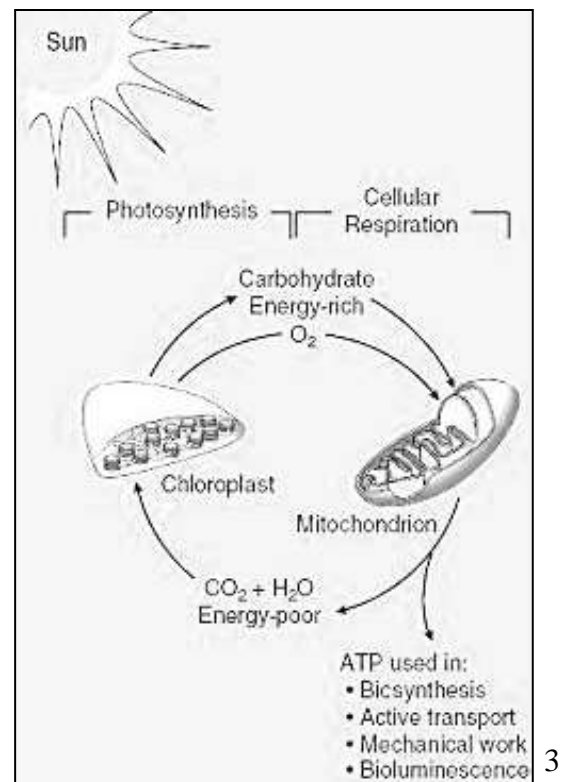
14. The graph shows how dissolved O<sub>2</sub> and CO<sub>2</sub> levels changed in a pond over a 24-hour period. What caused the decrease in O<sub>2</sub> concentration during the night?
- Decreased evaporation
  - Decreased photosynthesis
  - Decreased respiration
  - Decreased temperatures



15. A model of the ATP molecule is shown above. Which part of the molecule is broken to provide energy for metabolic reactions?
- 1
  - 2
  - 3
  - 4



16. Which statement is supported by the diagram?
- Carbohydrates are converted into ATP by the mitochondrion.
  - The mitochondrion uses the sun's energy directly.
  - The main source of energy for photosynthesis is carbohydrates.
  - The end products of photosynthesis do not provide energy for cellular respiration.



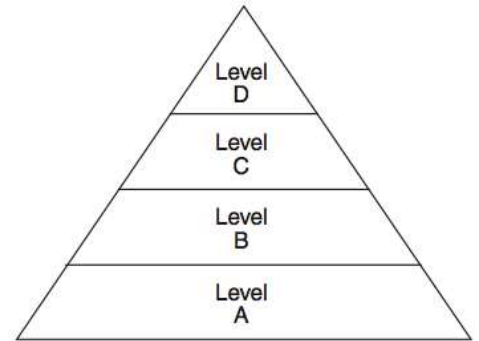
For questions 17-18, choose ALL correct answers. Indicate your answer on the Scantron form and on the test.

17. Which three of the following are required for photosynthesis to occur?

- a. carbon dioxide
- b. chlorophyll
- c. glucose
- d. oxygen
- e. water

18. An energy pyramid is shown above. Identify the three words below that could be used to correctly label trophic "Level A" in the pyramid.

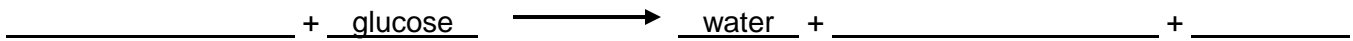
- a. autotrophs
- b. consumers
- c. heterotrophs
- d. photosynthesizers
- e. producers



For questions 19 – 20, follow the directions and write your answer in the space provided.

19. Using the word bank provided, complete the chemical equation for aerobic cellular respiration. Not all words will be used; no word will be used more than once.

ATP	carbon dioxide	glucose	oxygen	water	nitrogen
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20. Using the word bank provided, complete the chart below. All words will be used exactly once.

- |  |
|--|
| <ul style="list-style-type: none"> <li>• 2 ATP</li> <li>• 38 ATP</li> <li>• No oxygen required</li> <li>• Oxygen required</li> </ul> |
|--|

Type of Respiration	Oxygen Requirement	ATP Output
Aerobic		
Anaerobic		

For questions 21 – 26, refer to the following data table, which summarizes the results of an experiment on the enzyme catalase. Catalase is an enzyme which works in the cells to break down hydrogen peroxide into oxygen and water.

Write the answer to each question in the space provided. No partial credit will be awarded.

Temperature (°C)	Rate of oxygen production (mL/min)				
	Test 1	Test 2	Test 3	Test 4	Mean
10	5	7	4	8	6
20	10	12	13	9	11
30	20	24	23	21	22
40	60	66	68	65	64
50	18	22	21	19	20

21. Identify the independent variable. \_\_\_\_\_

22. Identify the dependent variable. \_\_\_\_\_

23. List one (1) important factors that were likely held constant during this experiment.  
\_\_\_\_\_

24. Identify the optimum temperature, based on the data, of the enzyme catalase. \_\_\_\_\_

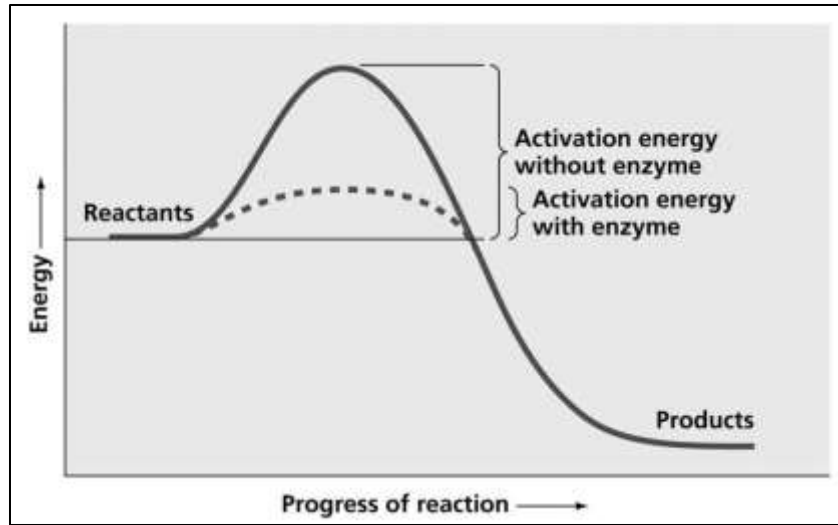
25. Based on the data, at which temperature did the enzyme catalase begin to denature? \_\_\_\_\_

26. Based on the data, at which temperature were the molecules in the reaction moving the slowest? \_\_\_\_\_

For questions 27 – 29, answer each question in the space provided using your own words. Diagrams may be used instead of complete sentences, but they must be labeled clearly and correctly.

27. What is the general function of all enzymes in biological systems?

28. Explain the relationship between photosynthesis and cellular respiration in terms of their reactants and products.



29. According to the graph, what happens to the activation energy of a chemical reaction when an enzyme is removed?