

## Cellular Energy

Name: \_\_\_\_\_

Date: \_\_\_\_\_

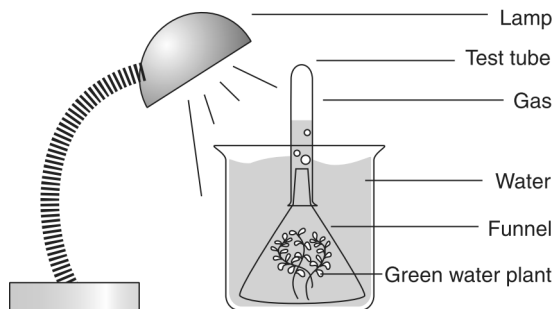
1. Which molecule supplies the energy for cellular functions?

- A. ATP
- B. oxygen
- C. DNA
- D. water

2. Which of the following gases do plants use in photosynthesis?

- A. hydrogen
- B. oxygen
- C. carbon dioxide
- D. carbon monoxide

3. **Photosynthesis Experiment**



Which gas is forming in the test tube shown above?

- A. carbon dioxide
- B. hydrogen
- C. oxygen
- D. nitrogen

4. Which of the following is broken down in the body to release energy?

- A. sugar
- B. water
- C. salt
- D. oxygen

5. Which of the following is produced when sugar is digested in an animal cell?

- A. carbon dioxide
- B. chlorophyll
- C. oxygen
- D. sunlight

6. During photosynthesis in plants, what is the source of the carbon in the sugar molecule ( $C_6H_{12}O_6$ )?

- A. carbon dioxide in the air
- B. carbon monoxide in the air
- C. carbon particles in the soil
- D. carbon particles in water

7. Which of the following processes allows the cells of an organism to use carbon from the environment?

- A. mitosis
- B. fertilization
- C. transpiration
- D. photosynthesis

8. Which molecule in plant cells first captures the radiant energy from sunlight?

- A. glucose
- B. carbon dioxide
- C. chlorophyll
- D. adenosine triphosphate

9. The first stage of photosynthesis in a chloroplast is

- A. light-dependent.
- B. temperature-dependent.
- C. glucose-driven.
- D. ATP-driven.

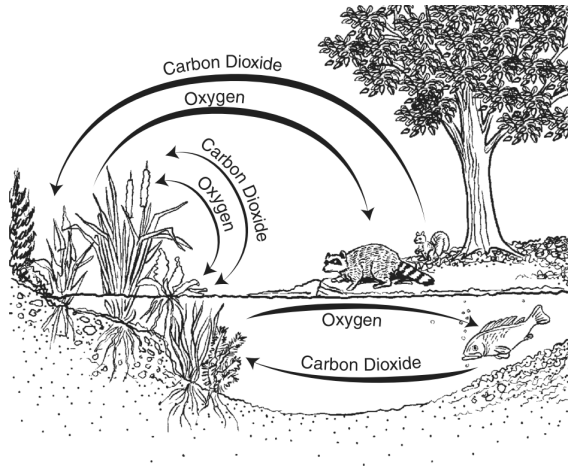
10. In aerobic respiration, the Krebs cycle (citric acid cycle) takes place in

- A. chloroplasts.
- B. nuclei.
- C. lysosomes.
- D. mitochondria.

11. Which of the following was made possible by the presence of photosynthetic bacteria on Earth?

- A. a water cycle
- B. an oxygen cycle
- C. carbon fixation
- D. anaerobic respiration

12.



Which of these statements is *best* illustrated by this diagram?

- A. Animals under water eat plants.
- B. Land animals exhale oxygen into water.
- C. Water-dwelling animals breathe carbon dioxide.
- D. Plants can take in carbon dioxide from air or water.

13. From Earth's atmosphere, carbon dioxide is used by plants, algae, and cyanobacteria during the process of

- A. photosynthesis.
- B. respiration.
- C. decomposition.
- D. nitrogen fixation.

14. Analysis of Gases From a Hawaiian Volcano

Gas	Amount
H <sub>2</sub> O (steam)	79%
CO <sub>2</sub>	12%
SO <sub>2</sub>	6.5%
N <sub>2</sub>	1.5%
H <sub>2</sub> , CO, Cl <sub>2</sub> , and Ar	trace

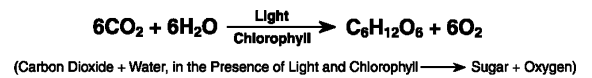
The table above lists the gases coming from a modern Hawaiian volcano. If ancient volcanoes gave off the same gases, which gas would have been *most* helpful in the development of early life-forms that could carry out photosynthesis?

- A. N<sub>2</sub>
- B. SO<sub>2</sub>
- C. CO<sub>2</sub>
- D. Cl<sub>2</sub>

15.

### Photosynthesis

The following equation represents the process of photosynthesis in green plants.

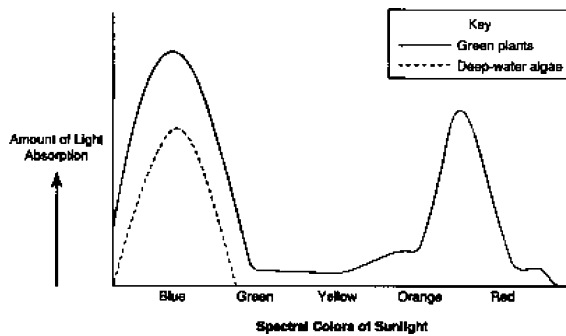


What happens to most of the light energy during photosynthesis?

- A. It is transformed into heat energy.
- B. It is transformed into chemical energy.
- C. It is changed into carbon dioxide.
- D. It is changed into oxygen.

16. Which statement about green plants is true?
- A. Most green plants do not need food.
  - B. Most green plants take in food through their roots.
  - C. Most green plants take in food through their leaves.
  - D. Most green plants manufacture their own food.

17.

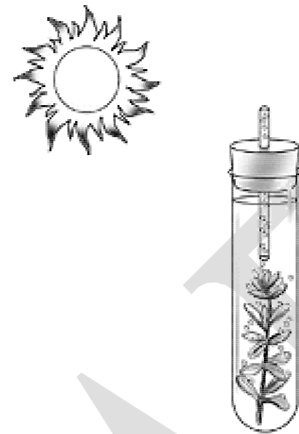


Based on the above graph, deep-water algae probably \_\_\_\_\_.

- A. have a higher rate of photosynthesis than green plants
- B. can appear to be green, yellow, orange or red
- C. reflect blue light
- D. absorb orange light

18. A student picked up Ball A off a shelf and threw it. Which of the following would show the flow of energy from its source?
- A. Light energy from the sun → chemical energy in food → chemical energy in the student → mechanical energy in the ball
  - B. Light energy from the sun → chemical energy in the student → chemical energy in food → mechanical energy in the ball
  - C. Chemical energy in the student → mechanical energy in the ball → chemical energy in food → light energy from the sun
  - D. Chemical energy in the student → chemical energy in food → mechanical energy in the ball → light energy from the sun

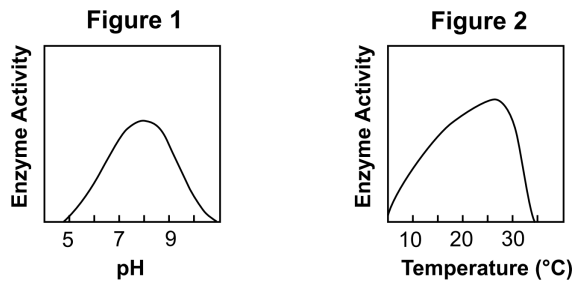
19. A sprig of an Elodea plant was placed in a test tube as shown below. The test tube was then placed in sunlight for 6 hours.



The bubbles of gas in the diagram are composed mainly of

- A. carbon monoxide
- B. carbon dioxide
- C. nitrogen
- D. oxygen

20. The figures below show the reaction rate of a specific enzyme at different temperatures and different pHs.



What can be concluded about the enzyme?

- A. The enzyme works best at a pH of 8 and a temperature of 25°C.
- B. The enzyme only works at a pH of 8 and a temperature of 25°C.
- C. The enzyme is used up at a pH of 11 and a temperature of 35°C.
- D. The enzyme works better at a pH of 8 than a temperature of 25°C.

21. **Plants**



What do plants need to make their food?

- A. **Animals**
- B. **Sun**
- C. **Rocks**



22. In which part of a plant does photosynthesis take place?

- A. bark
- B. flowers
- C. leaves
- D. roots

23. Photosynthesis is a chemical reaction that converts

- A. light energy into chemical energy.
- B. heat energy into mechanical energy.
- C. light energy into electrical energy.
- D. heat energy into electrical energy.

24. Through cell respiration, plants get energy from glucose. The energy stored in glucose originally came from

- A. plants.
- B. animals.
- C. the sun.
- D. geothermal sources.

25. The process of cellular respiration occurs in

- A. both plant and animal cells.
- B. plant cells only.
- C. animal cells only.
- D. neither plant nor animal cells.

26. In the oxygen cycle, which group of organisms replenishes a large portion of the atmospheric oxygen supply?

- A. mammals
- B. fungi
- C. insects
- D. plants

27. Use the information below to answer the following question.

Scientists believe that during its early formation, Earth's atmosphere contained little, if any, oxygen. Fossil and rock records suggest that by about two billion years ago, Earth's atmosphere was oxygen rich and that organisms with complex cells existed. Many scientists think that these organisms released oxygen, changing the composition of Earth's atmosphere.

Which process is the *most* scientifically plausible explanation for how the organisms released oxygen into Earth's atmosphere?

- A. The cells produced sugar and oxygen during photosynthesis.
- B. The cells gave off oxygen during cell division as they rapidly reproduced.
- C. The cells broke down carbon dioxide to carbon and oxygen to obtain energy.
- D. The cells combined nitrogen and hydrogen atoms by nuclear fusion to produce oxygen.

28. Use the diagram to answer the question.

### Gases and Photosynthesis



The diagram shows the gases that enter and leave a plant during the process of photosynthesis. Which gases do arrows 1 and 2 represent?

- A. Arrow 1 is nitrogen, and arrow 2 is oxygen.
- B. Arrow 1 is oxygen, and arrow 2 is nitrogen.
- C. Arrow 1 is oxygen, and arrow 2 is carbon dioxide.
- D. Arrow 1 is carbon dioxide, and arrow 2 is oxygen.

29. Which statement *best* describes the process of respiration?
- A. Oxygen and sugar are used in the process that provides energy to cells; water and carbon dioxide are its waste products.
  - B. Water and sugar are used in the process that provides energy to cells; oxygen and carbon dioxide are its waste products.
  - C. Oxygen and carbon dioxide are used in the process that provides energy to cells; sugar and water are its waste products.
  - D. Carbon dioxide and sugar are used in the process that provides energy to cells; water and oxygen are its waste products.

30. What is the *main* reason humans need nitrogen to survive?
- A. Nitrogen is used in respiration to generate energy.
  - B. Nitrogen is used in making the proteins in the body.
  - C. Nitrogen is used to help the body eliminate wastes.
  - D. Nitrogen is used by nerve cells to conduct impulses.

31. Photosynthesis includes processes that require light and processes that do not. Which statement *best* explains why adenosine triphosphate (ATP) is used in both processes?
- A. ATP is a building block of sugars and stores energy in plant cells.
  - B. ATP collects chemical energy from plant cells and produces light energy to build sugars.
  - C. ATP stores energy that plant cells absorb from light and releases the energy when it is needed to produce sugars.
  - D. ATP is an enzyme that increases the rate at which sugars are made and reduces the amount of energy that plant cells need.

32. Which of the following *best* describes how plants use the energy they receive from sunlight?
- A. They change water into heat.
  - B. They produce their own food.
  - C. They make minerals for their roots.
  - D. They break down nutrients into rocks.

33. In the process of photosynthesis, green plants use energy from sunlight to make which product?
- A. carbon dioxide
  - B. chlorophyll
  - C. sugar
  - D. DNA

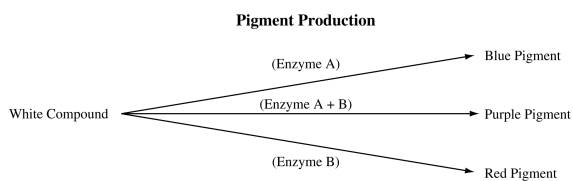
34. Students are studying the process of photosynthesis in plants. Which of the following is a product of photosynthesis?

- A. carbon dioxide
- B. nitrogen
- C. sodium chloride
- D. sugar

35. Which of the following materials are direct products of photosynthesis?

- A. fats and starches
- B. oxygen and sugar
- C. proteins and amino acids
- D. carbon dioxide and water

36. The diagram below shows a biochemical pathway.



In one species of plant, the flower petals are normally purple if both enzyme A and enzyme B are produced. If a mutation occurred that stopped production of enzyme A, but *not* enzyme B, what color flower petals would be produced?

- A. red
- B. blue
- C. white
- D. purple

37. A mutation that prevents a maple tree from efficiently taking gases from the air would *most directly* affect which of the following processes?

- A. reproduction
- B. photosynthesis
- C. water uptake
- D. DNA replication

38. Plants use many gallons of water every day. Almost all of the water used by plants is absorbed through the roots. Water leaves plants by which process?

- A. infiltration
- B. precipitation
- C. runoff
- D. transpiration

39. Cyanide is a powerful poison because it inhibits an enzyme in mitochondria, preventing the transfer of energy during one of the steps in cellular respiration. This poison would *directly* affect the production of which of the following molecules?

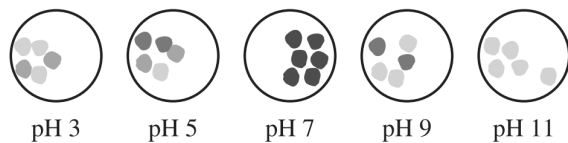
- A. ATP
- B. glucose
- C. oxygen
- D. RNA



40. The reaction catalyzed by the bacterial enzyme  $\beta$ -galactosidase forms a dark-colored end-product when the cells are grown on a particular agar medium. As more product is formed, the cells become darker.

Students performed an experiment to determine the optimum pH for activity of this enzyme. Their results are shown in the illustration of bacterial colonies below.

#### Bacterial Colony Color as a Function of pH



Based on these data, the students should conclude that  $\beta$ -galactosidase functions *best* at which pH?

- A. 5      B. 7      C. 9      D. 11

41. The illustration below shows a Siamese cat.

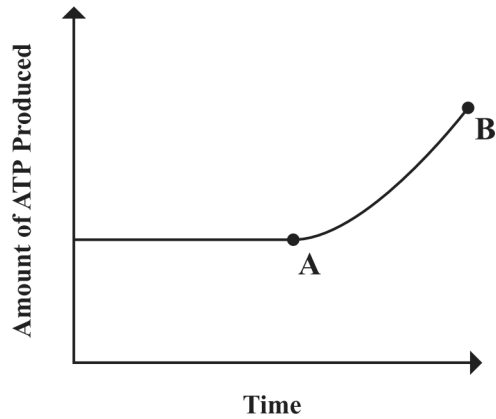


In Siamese cats, an enzyme determines the color of the fur. On the cooler places of the body, the enzyme causes darker fur. On the warmer parts of the body, the enzyme does not function.

Which of the following statements *best* explains how temperature affects this enzyme?

- A. Cooler temperatures denature the enzyme.  
B. Cooler temperatures cause more enzyme production.  
C. The enzyme is active in a specific temperature range.  
D. Heat allows the enzyme to break down white pigment.

42. The graph below shows the amount of ATP produced in a cell during a period of time.



According to the graph, which of the following processes *must* have increased between points A and B?

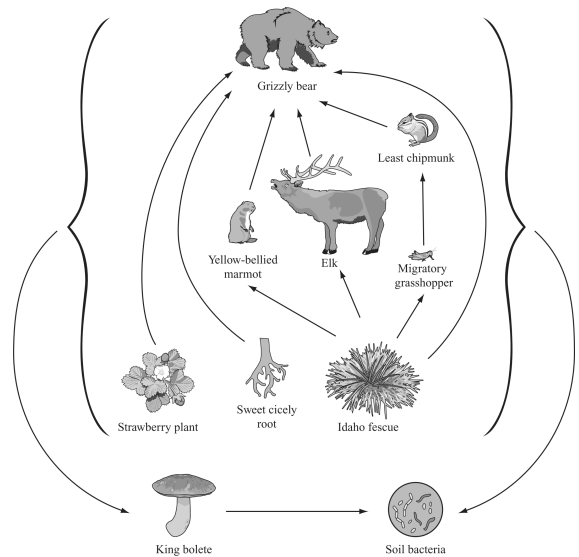
- A. cellular respiration    B. cytokinesis  
 C. DNA replication    D. meiosis
43. Which of the following occurs during photosynthesis?
- A.  $\text{CO}_2$  is used to produce water.  
 B.  $\text{CO}_2$  is absorbed by mitochondria.  
 C.  $\text{CO}_2$  and  $\text{H}_2\text{O}$  are converted to carbohydrates.  
 D.  $\text{CO}_2$  and  $\text{H}_2\text{O}$  are combined into carbonic acid.

44. Many land plants store energy in starch. When energy is needed, the starch molecules can be broken down quickly.

This chemical reaction produces which of the following?

- A. amino acids    B. lipids  
 C. monosaccharides    D. RNA chains

45. A partial food web for organisms in Yellowstone National Park is shown below.



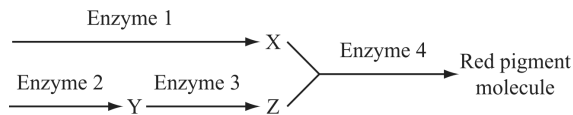
Which process do the animals in the food web use to convert energy from food into ATP?

- A. cellular respiration    B. osmosis  
 C. photosynthesis    D. transcription

46. Which of the following processes releases *primarily* oxygen into the atmosphere?

- A. combustion                      B. osmosis  
 C. photosynthesis                  D. respiration

47. The diagram below shows the final steps of a biochemical pathway used by the bacterium *Serratia marcescens* to produce a red pigment molecule. Letters X, Y, and Z represent intermediate molecules produced in the pathway. Four enzymes are also involved in the pathway, as shown.



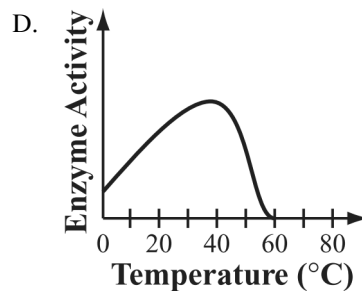
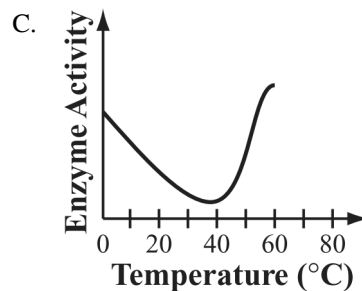
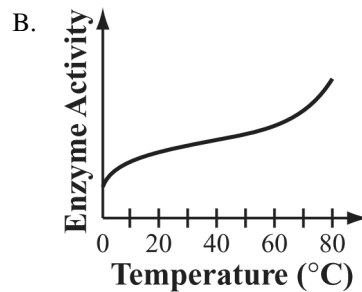
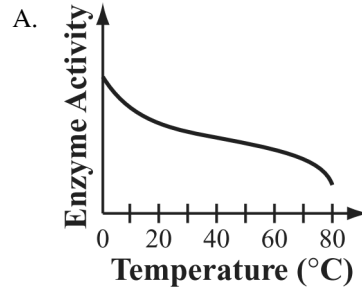
A mutant strain of *S. marcescens* produces molecules X and Y but does not produce the red pigment molecule or molecule Z.

Based on this result, it can be concluded that there must be a mutation in the gene coding for which enzyme?

- A. enzyme 1                      B. enzyme 2  
 C. enzyme 3                      D. enzyme 4

48. In the human digestive system, the enzyme trypsin acts on proteins. The optimal temperature for the enzyme is approximately 40°C.

Which of the following graphs shows how the activity of the enzyme *most likely* relates to the temperature of the reaction environment?



49. Both photosynthesis and cellular respiration involve all of the following *except*
- A. chlorophyll.                      B. glucose.  
 C. oxygen.                              D. water.

50. Which of the following statements correctly describes the processes of photosynthesis and cellular respiration?
- A. Photosynthesis and cellular respiration occur in the same organelle.  
 B. Photosynthesis and cellular respiration are performed by all organisms.  
 C. Photosynthesis produces carbon dioxide, and cellular respiration uses carbon dioxide.  
 D. Photosynthesis stores energy for cells, and cellular respiration releases energy for cells.

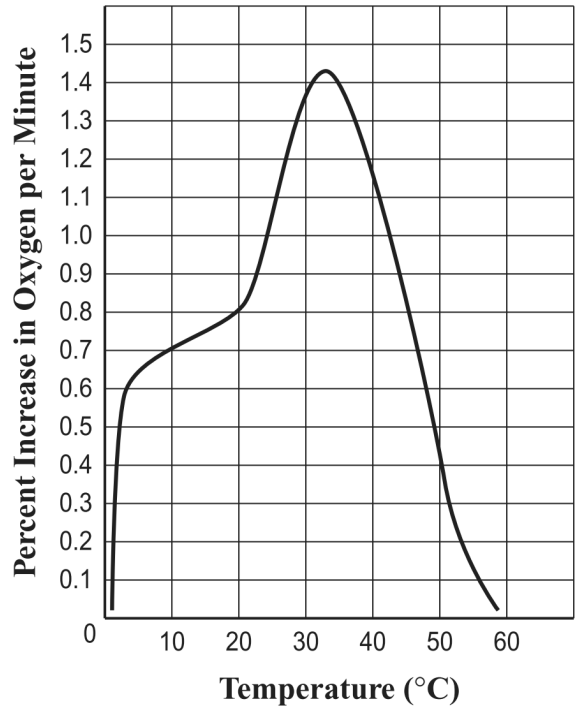
51. Air samples taken in Canada since 1986 show that atmospheric carbon dioxide concentration is higher on average in winter than in summer.

Which of the following statements *best* explains the difference in carbon dioxide concentrations?

- A. The rate of decomposition is slower in winter than in summer.  
 B. The greenhouse effect is more pronounced in winter than in summer.  
 C. The number of animals that are active is less in winter than in summer.  
 D. The amount of photosynthesis by plants is lower in winter than in summer.

52. The graph below shows the rate of activity for the enzyme catalase at different temperatures. Catalase helps convert hydrogen peroxide to oxygen and water. The rate of catalase activity is directly related to the percent increase in oxygen.

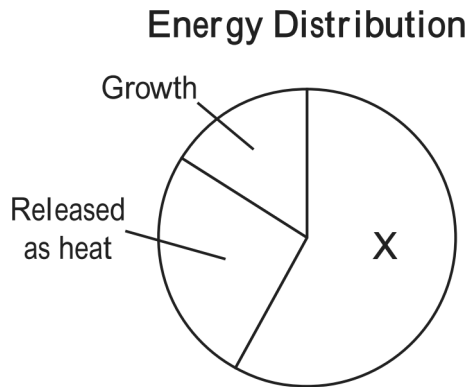
**Catalase Activity**



Based on the graph, which of the following conclusions can be made about the functioning of catalase?

- A. Catalase works best at 34°C.  
 B. Catalase is destroyed at 34°C.  
 C. Catalase cannot function at 51°C.  
 D. Catalase functions most efficiently at 51°C.

53. Plants absorb solar energy during photosynthesis. The graph below represents how this energy is distributed in some plants.

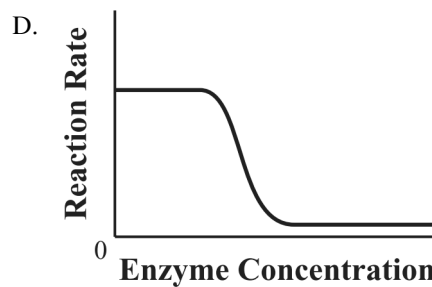
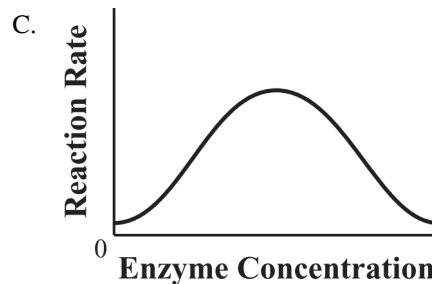
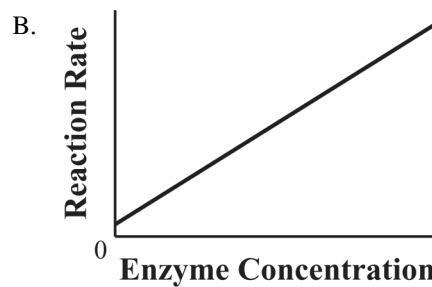
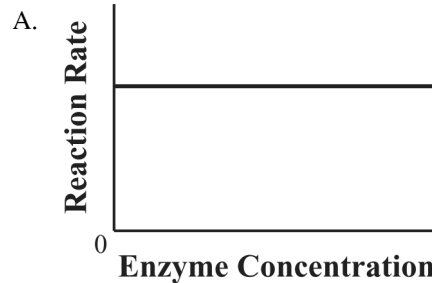


Which of the following statements describes what happens to the energy represented by the section labeled X?

- A. It is recycled to the Sun.
- B. It is consumed by decomposers.
- C. It is lost to the soil and the atmosphere.
- D. It is used for cellular respiration and maintenance.

54. A student is investigating how reaction rate changes over a range of enzyme concentrations. The student uses excess reactants.

Which of the following graphs *best* represents the relationship between enzyme concentration and reaction rate?

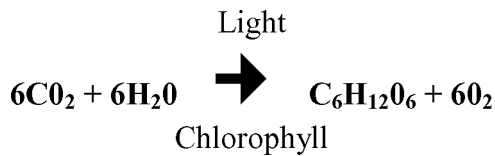


55. Mallory has four aquatic plants of the same size and species. She submerges each plant in a separate beaker filled with 200 mL of water. She then sets each beaker under a different intensity of light. Mallory observes that, of the four plants, the plant in the beaker under the most intense light gives off the most gas bubbles in a 20 min period.

Which of the following statements *best* explains Mallory's observations?

- A. Cells decompose most quickly under the most intense light.
- B. Water evaporates from plants fastest under the most intense light.
- C. Photosynthesis occurs at the highest rate under the most intense light.
- D. Gases in the leaves of plants expand most under the most intense light.

56. The following equation represents the process of photosynthesis in green plants.



(Carbon Dioxide + Water, in the Presence of Light and Chlorophyll → Sugar + Oxygen)

What happens to most of the light energy during photosynthesis?

- A. It is transformed into heat energy.
- B. It is transformed into chemical energy.
- C. It is changed into carbon dioxide.
- D. It is changed into oxygen.

57. In the process of photosynthesis, light energy is used to split water into hydrogen and oxygen. The hydrogen combines with carbon dioxide to ultimately produce \_\_\_\_\_.

- A. glucose
- B. nitrates
- C. chlorophyll
- D. hydrogen peroxide

58. Plants, like all other organisms, are composed of cells.

A group of students placed spinach leaves in a beaker of water in full sunlight. After several hours, small bubbles appeared on the leaves. These bubbles probably consisted of \_\_\_\_\_.

- A. H<sub>2</sub>O
- B. O<sub>2</sub>
- C. CO<sub>2</sub>
- D. H<sub>2</sub>

## Task

The human body is very complex. Below is information about how parts of the human body function to keep a person alive. Read the information and study the diagrams. Then answer the following questions.

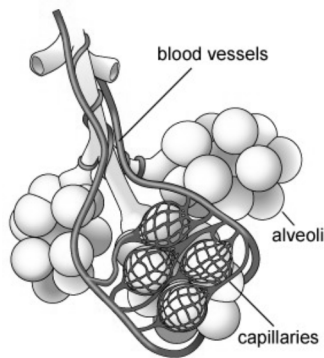
### **Materials Exchange from Blood**

The blood has the job of moving materials such as food molecules, vitamins, water, gases, and waste products through the body. Cells throughout the body exchange many substances with blood. However, some organs also move materials into and out of the blood. Diagrams 1 and 2 below show parts of the lungs and small intestine. The main function of each of these organs is to move materials into or out of the blood.

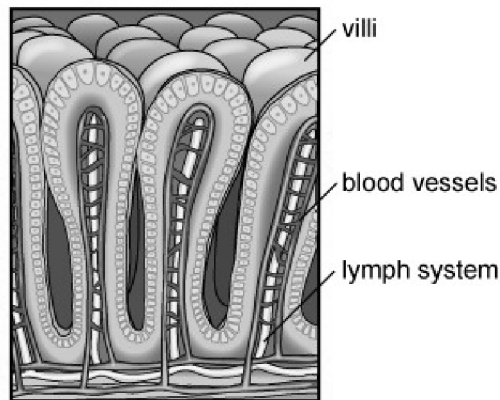
Some organs specialize in moving materials needed by the body into the blood. For example, molecules from digested food travel from the small intestine into the bloodstream. The blood then carries these food molecules throughout the body. This process enables cells in other parts of the body, like the brain, bones, muscles, and skin, to receive the nutrients they need to function.

Some organs specialize in helping the body get rid of waste products. Waste molecules are created by all cells in the body. The blood collects waste and carries it to organs that help the body get rid of the waste materials. These organs, such as the kidneys, have specialized structures that allow them to filter wastes out of the blood while keeping useful materials in. This ability to filter and remove wastes is important for all life.

**1. Alveoli in Lungs**



**2. Villi in Small Intestine**



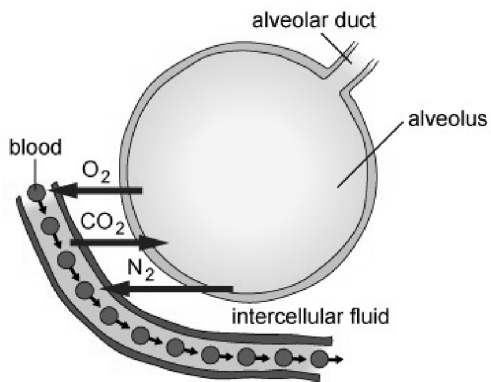
59. The table shows the percent of important gases in inhaled air and exhaled air.

**Gases in Inhaled and Exhaled Air**

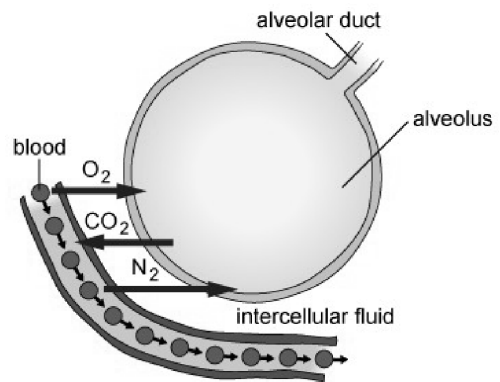
Gas	Inhaled Air	Exhaled Air
Nitrogen (N <sub>2</sub> )	79%	79%
Oxygen (O <sub>2</sub> )	21%	16%
Carbon Dioxide (CO <sub>2</sub> )	0.04%	4%

Which model shows how gases are exchanged in the alveoli in the lungs?

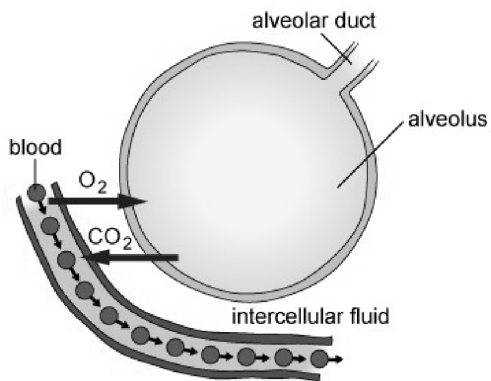
A.



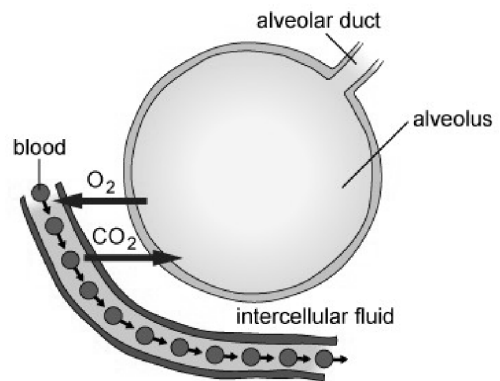
B.



C.



D.





60. The process of cellular respiration occurs in

- A. both plant and animal cells.
- B. plant cells only.
- C. animal cells only.
- D. neither plant nor animal cells.

61. Which two processes *both* increase the amount of carbon dioxide in the atmosphere?

- A. photosynthesis and volcanic activity
- B. photosynthesis and burning fossil fuels
- C. cellular respiration and deposition of sediments
- D. cellular respiration and decomposition of organic matter

62. Which of the following statements *best* describes photosynthesis?

- A. Carbon dioxide and water are turned into sugar and oxygen.
- B. Sugar and oxygen are turned into water and carbon dioxide.
- C. Oxygen and carbon dioxide are turned into water and sugar.
- D. Water and sugar are turned into oxygen and carbon dioxide.

63. Human tears contain the enzyme lysozyme, which damages the cell walls of bacteria. Which of the following statements about lysozyme is *most* accurate?

- A. Lysozyme causes mutations in bacterial cell wall molecules.
- B. Lysozyme is destroyed as it digests bacterial cell wall molecules.
- C. Lysozyme breaks a specific type of bond in a bacterial cell wall molecule.
- D. Lysozyme is converted to another chemical by a bacterial cell wall molecule.

64. In which of the following ways are photosynthesis and cellular respiration alike?

- A. Both processes produce glucose.
- B. Both processes consume carbon dioxide.
- C. Both processes take place in chloroplasts.
- D. Both processes involve energy transformations.

65. Which of the following *most likely* happens in the cells of a person running in the Boston Marathon?

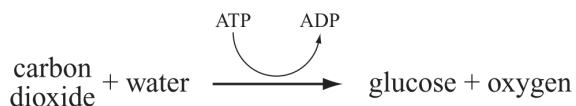
- A. The respiration rate increases to produce more ATP.
- B. The replication rate increases to produce more DNA.
- C. The photosynthesis rate increases to produce more sugars.
- D. The cell division rate increases to produce more muscle fibers.

66. Some bacteria live in hot springs. Their cells contain enzymes that function best at temperatures of 70°C or higher.

At a temperature of 50°C, how will the enzymes in these bacterial cells *most* likely be affected?

- A. The enzymes will be destroyed by lysosomes.
- B. The enzymes will lose their bond structure and fall apart.
- C. The enzymes will require less energy to function than at 70°C.
- D. The enzymes will not increase the rate of reactions as much as they would at 70°C.

67. An equation for a biochemical reaction is shown below.



Which of the following happens during this reaction?

- A. Energy from ATP is used to make glucose.
- B. ADP adds a high-energy bond to its structure.
- C. ADP is metabolized to provide oxygen to a cell.
- D. Energy is stored in the molecule ATP for future use.

68. In periods of hot, dry weather, the pores on the leaf surfaces of most plants close in order to reduce water loss during the day. When these pores are closed, plants cannot take in carbon dioxide.

As a direct result, the rate of which of the following processes decreases?

- A. cellular respiration
- B. mitosis
- C. nitrogen fixation
- D. photosynthesis

69. High levels of carbon dioxide in the blood trigger which of the following responses in the body?

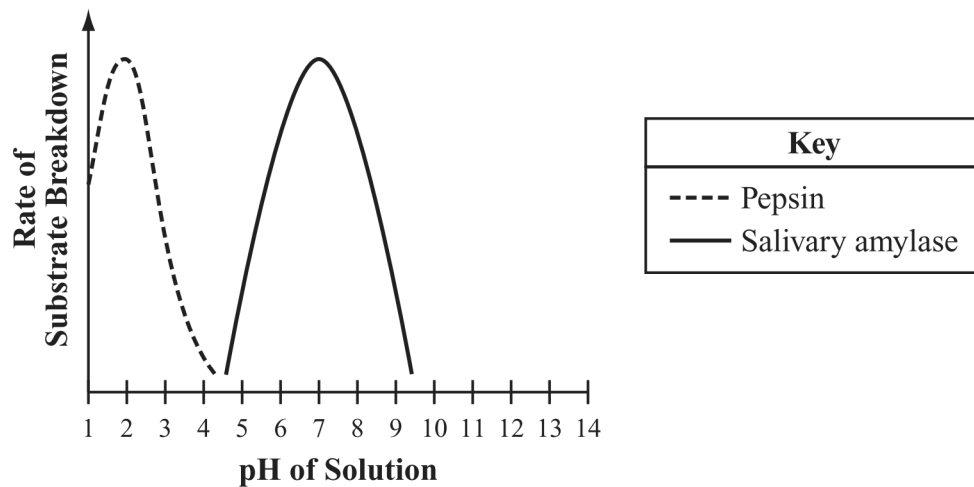
- A. an increase in the rate of digestion
- B. an increase in the rate of breathing
- C. a decrease in the speed of the pulse
- D. a decrease in the production of sweat

Biology students investigated various human digestive enzymes. The table below summarizes the functions of several different digestive enzymes.

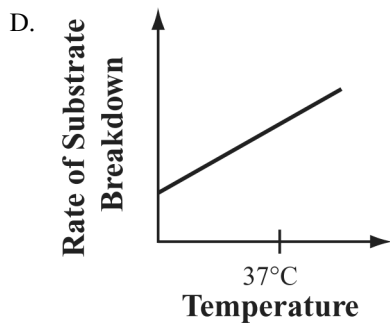
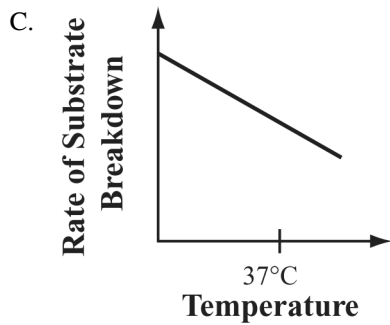
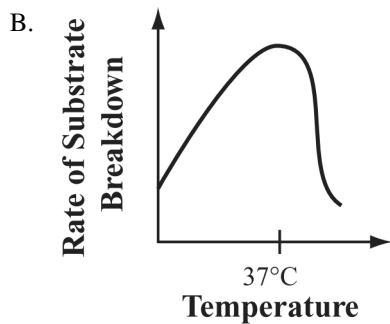
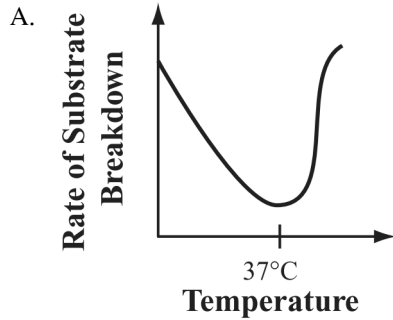
Enzyme	Function
salivary amylase	begins to break down starch into smaller polysaccharides or the disaccharide maltose
pepsin	begins to break down proteins into small polypeptides
pancreatic amylase	continues to break down starch and smaller polysaccharides into disaccharides
lipase	breaks down fats into glycerol, fatty acids, or glycerides
aminopeptidase	breaks down small polypeptides into amino acids

The students conducted experiments to study digestive enzyme activity. In the first experiment, the students observed the rate at which salivary amylase breaks down starch (the substrate) in solutions with different pH values. The students then performed the same type of experiment with pepsin. The graph below shows the students' results for the two experiments.

### Pepsin and Salivary Amylase Activity at Different pH Values



70. The students also plan to conduct an experiment to study the effect of temperature on pepsin activity. Which of the following graphs shows the expected results of this experiment?



71. The amount of water a plant has in its tissues is determined primarily by the balance of which of the following processes?

- A. runoff and root absorption
- B. respiration and photosynthesis
- C. precipitation and photosynthesis
- D. root absorption and transpiration

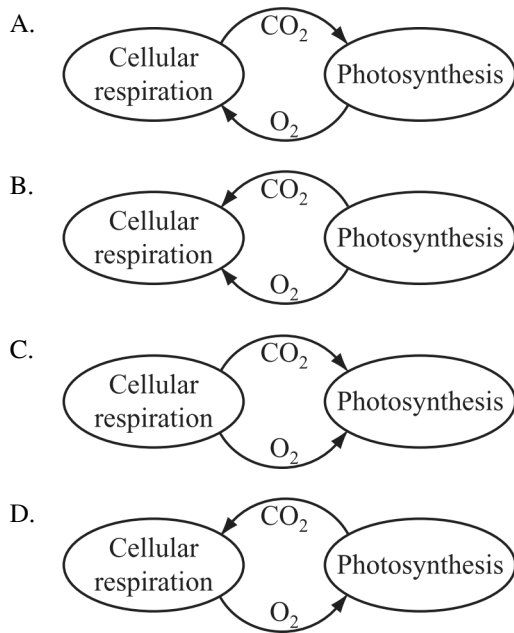
72. Which of the following processes makes it possible for plants to use energy from sunlight to produce their own food?

- A. metamorphosis
- B. photosynthesis
- C. pollination
- D. reproduction

73. Which part of a plant is *most* responsible for using energy from the Sun to produce food for the plant?

- A. flower
- B. leaf
- C. root
- D. stem

74. Which of the following diagrams accurately represents the use of gases in both cellular respiration and photosynthesis?



75. Which term describes the maintenance of a steady internal state in the body?

- A. gametogenesis      B. homeostasis  
C. mitosis              D. respiration

76. A major reservoir for oxygen is the atmosphere. Which of the following processes adds oxygen to the atmosphere?

- A. cellular respiration    B. combustion  
C. decomposition        D. photosynthesis

77. A boy jumps into a cold swimming pool and his body temperature goes down. His muscles, blood vessels, and nervous system work together to restore his body temperature.

Which term *best* describes this process?

- A. homeostasis            B. hypothermia  
C. reflex                    D. respiration

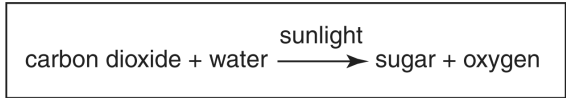
78. In which of the following ways does the respiratory system help to maintain homeostasis during exercise?

- A. Reserves of oxygen are built up in the alveoli.  
B. The pharynx supplies glucose so that the muscles can produce ATP.  
C. Breathing rate is increased to exchange oxygen and carbon dioxide more rapidly.  
D. The lungs release hemoglobin so that the blood can carry more oxygen to tissues.

79. During the processes of respiration and photosynthesis in plant cells, what are the three primary elements that cycle between the mitochondria and chloroplasts?

- A. carbon, iron, and sulfur  
B. hydrogen, carbon, and oxygen  
C. carbon, nitrogen, and phosphorus  
D. hydrogen, oxygen, and potassium

80. Use the chemical equation below to answer the following question.

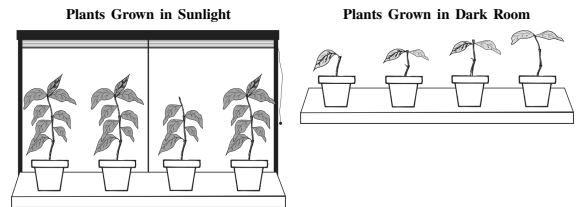


What process is represented by the chemical equation above?

- A. how plants make food
- B. how plants digest food
- C. how animals make food
- D. how animals digest food

81. Use the information below to answer the question(s) below.

In a lab study, eight bean plants are grown from seeds in individual containers. After a few leaves are visible on each plant, the plants are separated into two groups. One group is placed in a room that gets sunlight, and the other group is placed in a dark room. All of the plants receive the same amount of water daily. After two weeks, the plants are observed.



**OBSERVATIONS**

Plant Feature	Plants Grown in Sunlight	Plants Grown in Dark Room
Leaves	Dark green	Light yellow
Stem	Green and sturdy	Yellow and wilted
Average Plant Height	30 cm	18 cm

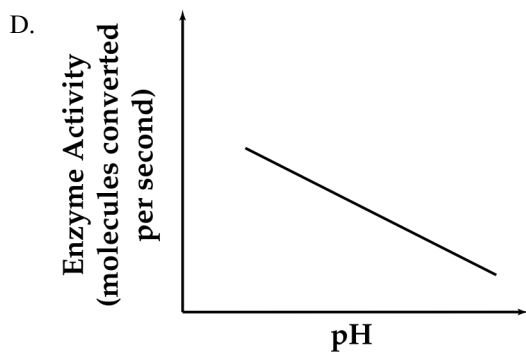
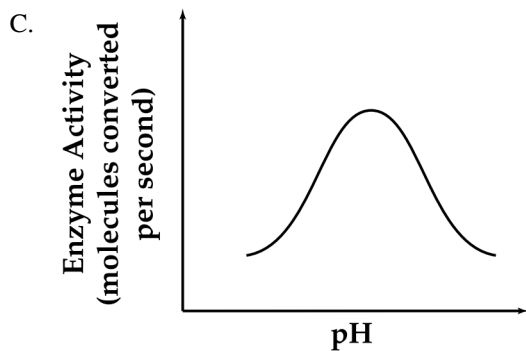
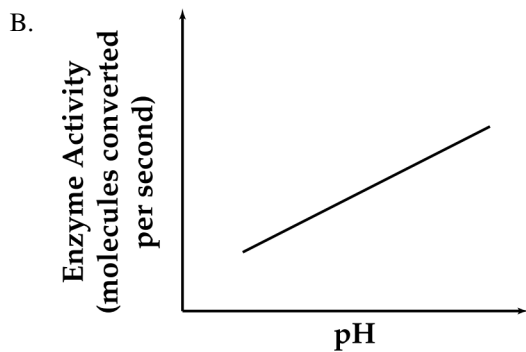
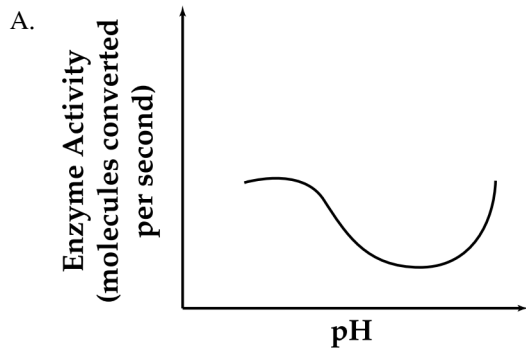
Plants use energy from the sun to convert

- A. sugars to oxygen and water
- B. oxygen and water to sugars
- C. carbon dioxide and water to sugars
- D. sugars to water and carbon dioxide

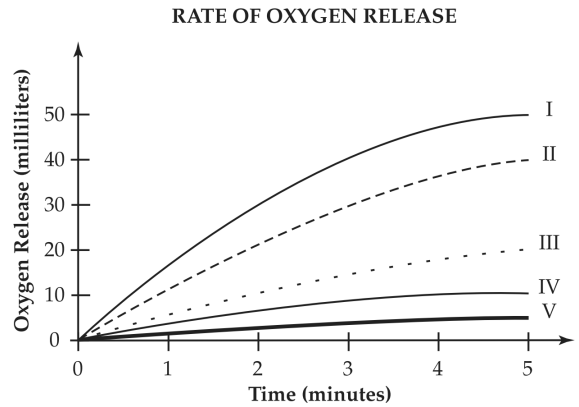
82. Which of these processes results in oxygen production?

- A. osmosis
- B. respiration
- C. evaporation
- D. photosynthesis

83. Which of these graphs shows how enzyme activity in mammals is *typically* affected by pH changes?



84. Catalase is an enzyme found in some animal cells. The enzyme speeds up the release of oxygen from the breakdown of hydrogen peroxide. The graph below shows the rate of oxygen release by catalase under different reaction conditions.



Catalase is most effective at a pH of 7. If Line IV represents catalase activity at pH 5, which line *most likely* shows the activity of the enzyme at pH 4?

- A. Line I                      B. Line II  
C. Line III                     D. Line V

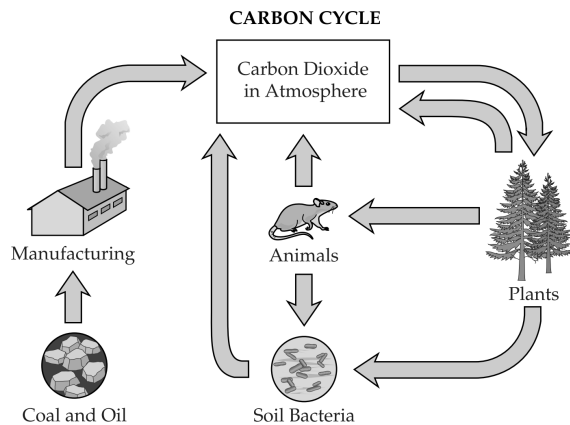
85. Some organisms that live in the intestines of cows do not require oxygen to survive. Which of these *best* describes the process by which these organisms obtain energy?

- A. osmosis  
B. mitosis  
C. aerobic respiration  
D. anaerobic respiration



86. Which of these supply the main energy source used in cellular respiration?
- A. lipids                      B. amino acids  
C. nucleic acids              D. carbohydrates

87. The diagram below shows part of the carbon cycle. Use the diagram to answer the following question(s).



During photosynthesis, trees convert carbon dioxide and other materials to

- A. lipids                      B. amino acids  
C. nucleic acids              D. sugars

88. Use the information below to answer the following question(s).

Scientists have recently discovered a new species that lives attached to the side of a tree. An organism from this new species

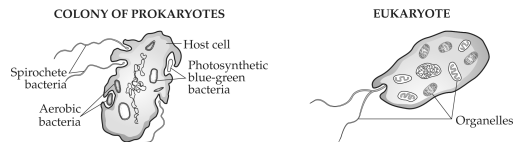
- is multicellular
- has cell walls
- has vascular tissues
- makes its own food
- has structures that absorb moisture from the air

The scientists put the organism in a sealed glass container and placed it in the sunlight for several hours. Which of these increased inside the container?

- A. water                      B. nitrogen gas  
C. oxygen gas              D. carbon dioxide gas

89. Use the information and the figure below to answer the following question(s).

The diagram below shows a colony of prokaryotes and a single-celled eukaryote. The eukaryote contains organelles that resemble the three types of bacteria found in the colony of prokaryotes. More than a billion years ago, bacteria like these may have joined other prokaryotes to form colonies of cells. Researchers think that these once free-living prokaryotes became the organelles of modern-day eukaryotes.



One of the organelles in the eukaryote releases energy from sugars. What is this process called?

- A. respiration                      B. transpiration  
C. photosynthesis                  D. chemosynthesis

90. What molecules control the reaction rate of photosynthesis?

- A. sugars                              B. enzymes  
C. fatty acids                          D. nucleic acids

91. In a recent experiment, scientists studied the effects of increased carbon dioxide levels on the growth of pine trees. The scientists observed that increased levels of carbon dioxide resulted in an increase in the average circumference of the tree trunks. The change in circumference is a result of the process of

- A. osmosis                              B. adaptation  
C. transpiration                      D. photosynthesis

92. Use the information and the table below to answer the following question(s).

*Elodea*, a freshwater plant, releases gas bubbles when it is placed in direct light. In an investigation, a student placed a lamp at different distances from an aquarium containing *Elodea*. The student counted the number of bubbles produced by the *Elodea* plant. His data are shown in the table below.

**GAS BUBBLE PRODUCTION BY *ELODEA***

Distance of Plant From Light (cm)	Production of Gas Bubbles/Minute
10	40
20	20
30	10
40	5

What energy source is used by *Elodea*?

- A. heat                                      B. light  
C. oxygen                                  D. Carbon dioxide

93. The bubbles released by *Elodea* contain mostly

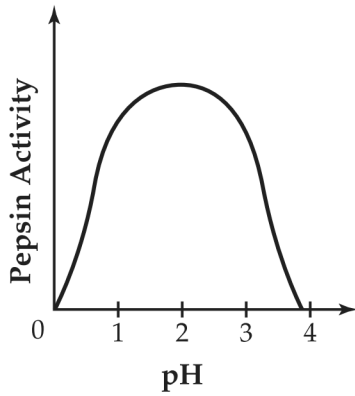
- A. oxygen
- B. carbon dioxide
- C. nitrogen
- D. water vapor

94. The energy required for photosynthesis is provided by

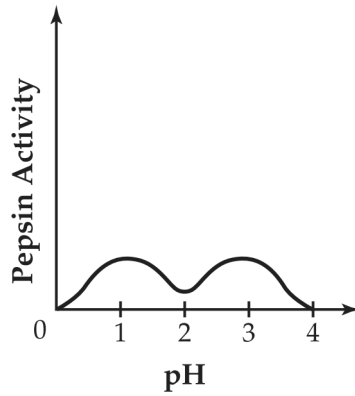
- A. proteins
- B. sunlight
- C. chlorophyll
- D. carbohydrates

95. Cells in the stomach produce pepsin, an enzyme, to help digest food. Pepsin works best at a pH of 2. Which of these graphs *most likely* shows what will happen to the activity of pepsin as the pH of the stomach is increased?

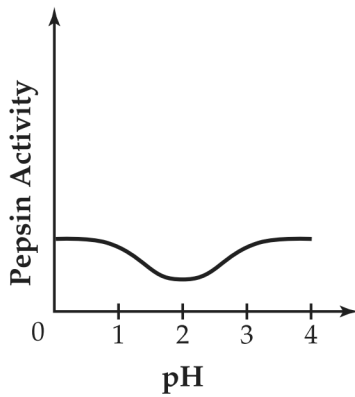
A. EFFECT OF pH ON PEPSIN ACTIVITY



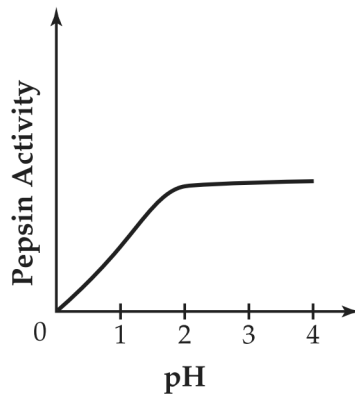
B. EFFECT OF pH ON PEPSIN ACTIVITY



C. EFFECT OF pH ON PEPSIN ACTIVITY



D. EFFECT OF pH ON PEPSIN ACTIVITY



96. Use the information and the table below to answer the following question(s).

A group of students separated 16 bean plants into four equal groups. They exposed each group to a different number of hours of light. The table below shows the amount of light each group of bean plants received. All other conditions were kept the same.

**AMOUNT OF LIGHT RECEIVED BY BEAN PLANTS**

<b>Plant Group</b>	<b>Exposure to Light (in hours)</b>
1	No light (kept in dark container)
2	5
3	10
4	15

The students measured the total leaf surface area of each plant once a day for two weeks.

Which of these processes were the students *most likely* studying?

- A. diffusion                      B. photosynthesis  
C. chemosynthesis              D. mutation

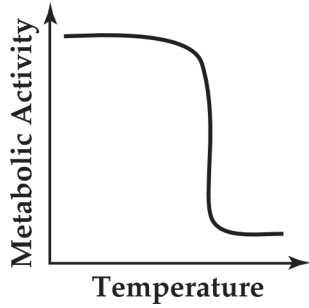
97. The students measured the total leaf surface area of each plant once a day for two weeks.

Which plant group will *most likely* have the greatest total leaf surface area after two weeks?

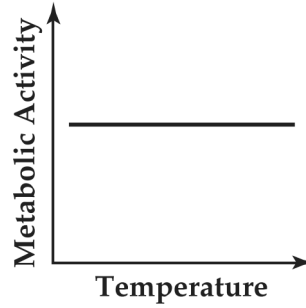
- A. Group 1                      B. Group 2  
C. Group 3                      D. Group 4

98. In crickets, the rate of chirping is related to the temperature of the air. The rate of chirping can be used to describe their metabolic activity. Which of these graphs *most likely* shows how temperature affects metabolic activity in crickets?

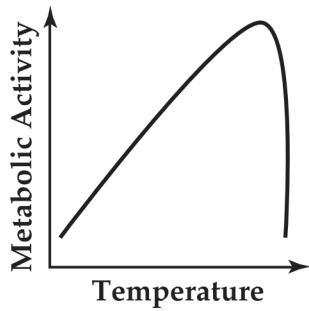
A. CHANGE IN METABOLIC RATE



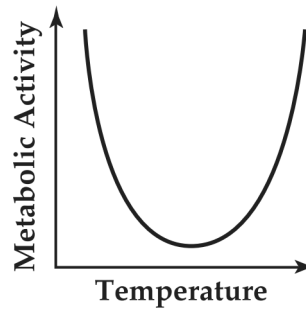
B. CHANGE IN METABOLIC RATE



C. CHANGE IN METABOLIC RATE

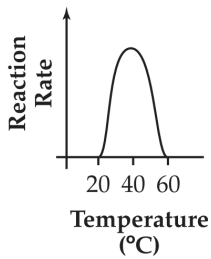


D. CHANGE IN METABOLIC RATE

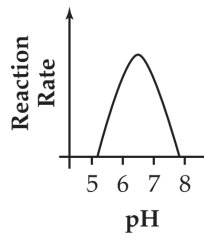


99. The graphs below show the effects of temperature and pH on the reaction rate of an enzyme.

**EFFECT OF TEMPERATURE  
ON ENZYME  
REACTION RATE**



**EFFECT OF pH  
ON ENZYME  
REACTION RATE**



Food will stay fresh longer when enzyme activity is slowed. Which of the following conditions would *most likely* slow enzyme activity?

- A. reducing pH from 8 to 7 by adding a weak acid
- B. increasing pH from 5 to 6 by adding a weak base
- C. reducing temperature from 30°C to 20°C by refrigeration
- D. increasing temperature from 30°C to 40°C by heating
100. Which of these statements about photosynthesis and respiration is true?
- A. Both processes produce food.
- B. Both processes release energy from food.
- C. Photosynthesis produces oxygen; respiration does not.
- D. Photosynthesis produces carbon dioxide; respiration does not.

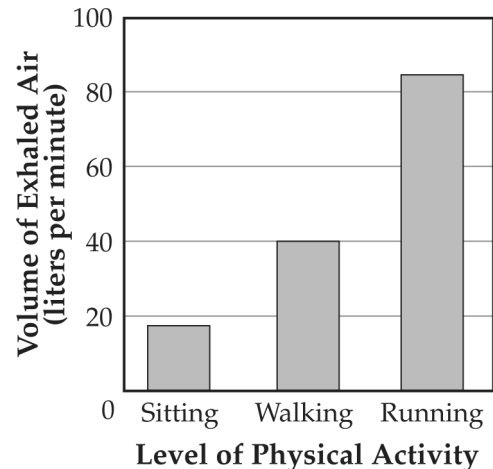
101. Some types of bacteria live deep in the ocean where sunlight cannot reach. These bacteria use the energy stored in inorganic molecules to make sugars.

Which of these processes do the bacteria use to produce sugars?

- A. photosynthesis      B. chemosynthesis
- C. aerobic respiration      D. nitrogen fixation
102. Use the information and the graph below to answer the following question(s).

A group of students measured the volume of air they exhaled during three different activities: sitting, walking, and running. The volume of exhaled air is directly related to the amount of carbon dioxide produced. The data the students collected are summarized in the graph below.

**MEASUREMENT OF EXHALED AIR**



Which of these processes produces carbon dioxide?

- A. mitosis      B. diffusion
- C. respiration      D. photosynthesis

103. Which of the following pairs of materials is required for a cell to carry on respiration?

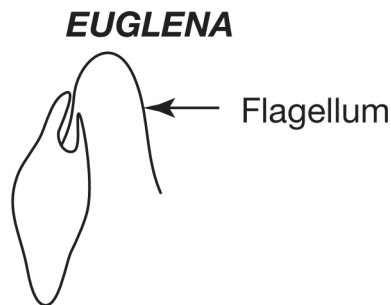
- A. water and oxygen
- B. glucose and oxygen
- C. water and carbon dioxide
- D. glucose and carbon dioxide

104. Use the information and data table below to answer the following question(s)

A student performed an investigation on green single-celled organisms called *Euglena*. Two samples of *Euglena* were placed in two different containers of water taken from the same source. One sample of *Euglena* was kept in a dark area. The other sample of *Euglena* was kept in a lighted area. The student recorded the observations in the table below.

**OBSERVATIONS OF EUGLENA**

<b>Sample 1: In Dark Area</b>	<b>Sample 2: In Lighted Area</b>
Uses a flagellum to move	Uses a flagellum to move
Takes in other organisms	Moves toward light
Some divide into two small organisms	Some divide into two small organisms
Various sizes	Various sizes



What is the primary source of energy used by *Euglena* in Sample 2?

- A. food
- B. oxygen
- C. sunlight
- D. water

Cellular Energy 4/22/2019

- |         |   |         |   |
|---------|---|---------|---|
| 1.      |   | 21.     |   |
| Answer: | A | Answer: | B |
| 2.      |   | 22.     |   |
| Answer: | C | Answer: | C |
| 3.      |   | 23.     |   |
| Answer: | C | Answer: | A |
| 4.      |   | 24.     |   |
| Answer: | A | Answer: | C |
| 5.      |   | 25.     |   |
| Answer: | A | Answer: | A |
| 6.      |   | 26.     |   |
| Answer: | A | Answer: | D |
| 7.      |   | 27.     |   |
| Answer: | D | Answer: | A |
| 8.      |   | 28.     |   |
| Answer: | C | Answer: | D |
| 9.      |   | 29.     |   |
| Answer: | A | Answer: | A |
| 10.     |   | 30.     |   |
| Answer: | D | Answer: | B |
| 11.     |   | 31.     |   |
| Answer: | B | Answer: | C |
| 12.     |   | 32.     |   |
| Answer: | D | Answer: | B |
| 13.     |   | 33.     |   |
| Answer: | A | Answer: | C |
| 14.     |   | 34.     |   |
| Answer: | C | Answer: | D |
| 15.     |   | 35.     |   |
| Answer: | B | Answer: | B |
| 16.     |   | 36.     |   |
| Answer: | D | Answer: | A |
| 17.     |   | 37.     |   |
| Answer: | B | Answer: | B |
| 18.     |   | 38.     |   |
| Answer: | A | Answer: | D |
| 19.     |   | 39.     |   |
| Answer: |   | Answer: | A |
| 20.     |   | 40.     |   |
| Answer: | A | Answer: | B |



41.  
Answer: C

42.  
Answer: A

43.  
Answer: C

44.  
Answer: C

45.  
Answer: A

46.  
Answer: C

47.  
Answer: C  
Objective: B.06E

48.  
Answer: D

49.  
Answer: A

50.  
Answer: D

51.  
Answer: D

52.  
Answer: A

53.  
Answer: D

54.  
Answer: B

55.  
Answer: C

56.  
Answer:

57.  
Answer:

58.  
Answer: B

59.  
Answer: D

60.  
Answer: A

61.  
Answer: D

62.  
Answer: A

63.  
Answer: C

64.  
Answer: D

65.  
Answer: A

66.  
Answer: D

67.  
Answer: A

68.  
Answer: D

69.  
Answer: B

70.  
Answer: B

71.  
Answer: D

72.  
Answer: B

73.  
Answer: B

74.  
Answer: A

75.  
Answer: B

76.  
Answer: D

77.  
Answer: A

78.  
Answer: C

79.  
Answer: B

80.  
Answer: A

81.  
Answer: C

82.  
Answer:

83.  
Answer:

84.  
Answer:

85.  
Answer:

86.  
Answer: D
87.  
Answer: D
88.  
Answer: C
89.  
Answer: A
90.  
Answer: B
91.  
Answer: D
92.  
Answer: B
93.  
Answer: A
94.  
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95.  
Answer: A
96.  
Answer: B
97.  
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98.  
Answer: C
99.  
Answer: C
100.  
Answer: C
101.  
Answer: B
102.  
Answer: C
103.  
Answer: B
104.  
Answer: C