

K

Match the function to the system.

- 1 a. Circulatory system
- 5 b. Digestive system
- 6 c. Lymphatic system
- 3 d. Respiratory system
- 4 e. Excretory system
- 2 f. Immune system

- ~~1.~~ Transport of gases, sugars, and fluids throughout the body
- ~~2.~~ Fights infections and foreign agents in the body
- ~~3.~~ Exchanges gases between the environment and the body
- ~~4.~~ Filters fluids and wastes out of the blood with the kidney
- ~~5.~~ Breaks ingested materials into small chemical units
- ~~6.~~ Returns interstitial fluid to the blood

Multiple Choice

1. Microvilli facilitate the process of
 - a. cellular ~~secretion~~
 - b. protein ~~synthesis~~
 - c. cellular ~~movement~~
 - d. cellular absorption
 - e. genetic ~~reproduction~~

2. Short, protein, hair-like projections found on the outside of the plasma membrane are called
 - a. cilia
 - b. flagella
 - c. microvilli
 - d. centrioles
 - e. spindle fibers

3. Which of the following is an example of active transport?
 - a. a cell transport proteins and lipids through the endoplasmic reticulum
 - b. water moves through a lining membrane until the cell membrane bursts
 - c. the movement of molecules from an area of low to and area of high concentration
 - d. a cell membrane allows sodium to pass, but does not allow potassium to pass through
 - e. a specific substrate attaches to the active site of an enzyme during a chemical reaction

4. ATP production occurs in the
 - a. nucleus
 - b. mitochondria only
 - c. nucleolus and the ribosomes
 - d. mostly in the cytoplasm but also in the nucleus
 - e. mostly in the mitochondria but also in the cytoplasm

5. If the enzyme in the mitochondria was competitively inhibited with cyanide
 - a. diffusion would speed up
 - b. active transport would stop - because it needs ATP made in the mitochondria which isn't made due to inhibition.
 - c. osmosis would completely stop
 - d. diffusion would stop
 - e. active transport would speed up causing cell lysis

ENZYMES

Multiple Choice

- An enzyme is
 - carbohydrate
 - lipid
 - protein
 - nucleic acid
- The function of an enzyme is to
 - cause chemical reactions that would not otherwise take place.
 - change the rates of chemical reactions. *speeds them up*
 - control the equilibrium points of reactions.
 - change the directions of reactions.
- The enzyme sucrase acts on *specific enzymes have specific jobs*
 - sucrose only
 - sucrose and starch
 - any disaccharide
 - any organic monomer
- Hydrogen cyanide binds to the active site of an enzyme that is part of the pathway that forms ATP in cells; in this way, it prevents the enzyme's activity. Hence, hydrogen cyanide can best be described as a
 - coenzyme
 - cofactor
 - competitive inhibitor
 - allosteric modulator
- An enzyme promotes a chemical reaction by
 - lowering the energy of activation.
 - causing the release of heat, which acts as a primer.
 - changing the free energy difference between substrate and product
 - increasing molecular motion and therefore increasing molecular collisions
- In feedback inhibition, a metabolic pathway is switched off by
 - a rise in temperature
 - lack of a substrate
 - accumulation of the end product
 - competitive inhibition

*Substrate
active site
enzyme*

Fill in the Blanks

- A substance that accelerates a chemical reaction, but itself remains unchanged when the reaction is over, is a catalyst. In living things, most of these substances are known as enzymes.
- A high fever is dangerous to a human because enzymes are denatured by heat. This causes the shape of their active site to change and therefore the enzyme can no longer function at optimum capacity.
- A metabolic pathway is a sequence of reactions, in which each step is controlled by its own specific enzymes.
- Metabolism involves two kinds of processes: (hydrolysis) catabolism in which larger molecules are broken down into smaller ones, and anabolism, in which larger molecules are built from smaller ones. During growth, the rate of the dehydration synthesis process exceeds the rate of the hydrolysis process.

*dehydration
synthesis*

PHOTOSYNTHESIS

Multiple Choice

- An autotroph is an organism that
 - requires no input of materials from its environments
 - sustains itself without eating other organisms
 - sustains itself without aerobic cellular respiration
 - uses ammonia instead of ~~water~~ as a solvent
- An autotroph gets its carbon from
 - carbon dioxide
 - methane
 - soil
 - organic molecules
- A heterotroph is an organism that gets its energy from
 - heat
 - light
 - inorganic molecules
 - organic molecules
- A heterotroph gets its carbon from
 - carbon dioxide
 - methane
 - soil
 - organic molecules
- Photosynthetic autotrophs get their energy from
 - heat
 - light
 - inorganic molecules
 - organic molecules
- Which of the following equations is the correct summary of photosynthesis
 - $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{LIGHT} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
 - $6\text{CO}_2 + 12\text{NH}_3 + \text{LIGHT} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{H}_2\text{N}_2$
 - $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O} + \text{LIGHT} \rightarrow 6\text{CO}_2 + 12\text{H}_2\text{O}$
 - $3\text{CO}_2 + 6\text{H}_2\text{O} + \text{LIGHT} \rightarrow \text{C}_3\text{H}_6\text{O}_3 + 3\text{O}_2 + 3\text{H}_2\text{O}$
- In a plant cell, the light reactions of photosynthesis take place in the
 - cytoplasm
 - endoplasmic reticulum
 - mitochondria
 - chloroplasts *thylakoid*
- In a plant cell, the light independent reactions of photosynthesis take place in the
 - cytoplasm
 - endoplasmic reticulum
 - mitochondria
 - chloroplasts *stroma*
- Which of the following colors of light work(s) best for photosynthesis?
 - green
 - yellow
 - blue and red
 - violet and yellow
- Which of the following colors of light is (are) the least effective in photosynthesis

- a. green
- b. yellow
- c. blue and red
- d. violet and yellow

11. The red, orange, and yellow colors of autumn leaves are caused by light reflected from

- a. chlorophyll a
- b. chlorophyll b
- c. chlorophyll c
- d. carotenoids

12. The pigment molecules of a chloroplast are located

- a. within its thylakoid membranes
- b. within its "intrathylakoid" spaces
- c. within its inner membrane
- d. within the space between its inner and outer membranes

13. A source of protons for the proton gradient within a chloroplast is

- a. phospholipids within the thylakoid membranes
- b. water
- c. CH_2O
- d. chlorophyll

14. When sunlight is on the chloroplast, pH is lowest in the

- a. stroma
- b. space enclosed by the inner and outer membranes
- c. spaces enclosed by the thylakoid membranes *because hydrogen ions will ↑ which will ↓ pH*
- d. cytoplasm

15. In photosynthesis, energy for attaching phosphate to ADP in photosystem II comes directly from

- a. oxidation of glucose
- b. reduction of glucose
- c. a proton gradient *E.T.C*
- d. formation of NADPH

16. The molecule in the Calvin-Benson cycle that combines with carbon dioxide is

- a. ADP
- b. ribulose biphosphate *RuBP*
- c. pyruvic acid
- d. citric acid

17. How many carbon atoms are there in a molecule of RuBP?

- a. 2
- b. 3
- c. 5
- d. 6

18. Plants store glucose as

- a. monosaccharides
- b. cellulose
- c. starch
- d. glycogen

19. If all of green plants were to suddenly disappear, which of the following substances normally found in the atmosphere would be first to be used up?

- a. CO₂
- b. N₂
- c. H₂O_(g)
- d. O₂

20. Which of the following occurs during the light-independent reaction of photosynthesis?

- a. ATP is produced
 - b. Chlorophyll releases energy
 - c. Hydrogen is released from water
 - d. Carbohydrate molecules are synthesized *Carbon-fixation*
- } light dependent*

Fill in the Blanks

1. Photosynthesis is the transformation of light energy to chemical energy.
2. In plants, the main kind of light-absorbing molecule is chlorophyll.
3. If an object appear black, it absorbs all wavelengths of light; if it appears white, it reflects all wavelengths of light.
4. When a photon of light is absorbed by a pigment, one of the pigment's e is elevated to a state in which it has more energy.
5. In the light dependent reactions, light energy is absorbed and briefly stored in the molecules ATP and NADPH.
6. In the light-independent reactions of photosynthesis, the energy stored in ATP and NADPH is used to build glucose.
7. The light-independent reaction takes place in the stroma of the chloroplast.
8. Carbon dioxide reaches the photosynthetic cells of a plant by way of specialized openings in the leaves known as stomata.

CELLULAR RESPIRATION

Multiple Choice

1. The function of cellular respiration is to
 - a. make ATP
 - b. make NADH
 - c. get rid of glucose
 - d. get rid of carbon dioxide
2. The term anaerobic means
 - a. with glucose
 - b. with oxygen
 - c. without glucose
 - d. without oxygen
3. Which of the following processes makes direct use of oxygen?
 - a. Glycolysis
 - b. Fermentation
 - c. Krebs cycle
 - d. Electron transport *final e acceptor*
4. How many molecules of oxygen gas (O₂) are used during the glycolysis of one glucose molecule?
 - a. 0

- b. 1
c. 16
d. 38
5. During glycolysis, glucose is split into
 a. two pyruvic acid molecules
 b. two lactic acid molecules
 c. one lactic acid plus one ethanol molecule
 d. two coenzyme A molecules
6. When oxygen is not available to a muscle cell, NADH formed during glycolysis does not pass electrons to the electron transport system. Instead it passes hydrogen atoms to
 a. Acetyl CoA
 b. pyruvic acid *to become lactic acid.*
 c. fructose
 d. ADP
7. Which one of the following processes releases a carbon dioxide molecule?
 a. glycolysis ✗
 b. lactic acid fermentation ✓
 c. alcohol fermentation
 d. hydrolysis of glycogen ✗
8. How many carbon atoms are in a citric acid molecule, the molecule formed when acetyl Co A enters the Krebs Cycle?
 a. 2
 b. 3
 c. 4
 d. 6
- CO₂-COA*
9. At the end of the Krebs cycle, most of the energy removed from the glucose molecule has been transferred to
 a. NADH and FADH₂
 b. ATP
 c. citric acid
 d. pyruvic acid
10. In the electron transport system, the final acceptor of electrons is
 a. cytochrome b
 b. cytochrome a₃
 c. substance Q
 d. oxygen
11. In aerobic cellular respiration, most of the ATP is synthesized during
 a. glycolysis
 b. oxidation of pyruvic acid
 c. Krebs cycle
 d. electron transport
12. The free energy change from the conversion of one molecule of glucose to six molecules of carbon dioxide is -686 kcal/mol, yet only about 266 kcal/mol of this is captured within ATP molecules. The rest is
 a. converted to heat
 b. lost within carbon dioxide
 c. used to form lactic acid
 d. transferred to water molecules
15. Glycolysis takes place
 a. within the chloroplast
 b. on the rough endoplasmic reticulum
 c. in the cytoplasm

d. within the mitochondrion

16. The Krebs cycle and electron transport take place

- a. within the chloroplast
- b. on the rough endoplasmic reticulum
- c. in the cytoplasm
- d. within the mitochondrion

matrix
inner membrane

17. The inner membrane of a mitochondrion is very selective about what it allows to leave the organelle. One molecule that regularly passes out of a mitochondrion is

- a. citric acid *enters*
- b. ATP
- c. pyruvic acid
- d. glucose

18. Within the mitochondrion, the proton gradient develops across the

- a. inner membrane
- b. outer membrane
- c. intermembrane space
- d. matrix

19. The function of the mitochondrial cristae is to

- a. prevent escape of oxygen gas
- b. store Acetyl CoA
- c. increase surface area of the inner membrane
- d. increase the availability of phospholipids

20. For an animal cell, the main advantage of aerobic cellular respiration over lactic acid fermentation is that

- a. more energy is released from each glucose molecule ✓
- b. less carbon dioxide is released
- c. more carbon dioxide is released
- d. fats and proteins are not used as fuel

Fill in the Blanks

1. Aerobic cellular respiration has ⁴ three stages: Glycolysis, Transition (*pyruvate oxidation*), Krebs cycle, and Electron Transport Chain (E.T.C)

2. Glycolysis is turned off when ATP is present in adequate amounts. This is an example of negative feedback or feedback inhibition.

3. In fermentation, the hydrogen atoms removed from glucose end up as part of lactic acid or alcohol (*ethanol*), depending on the type of cell.

4. In the fermentation of one glucose molecule, there is a net gain of 2 molecules of ATP.

5. Glucose has 6 carbon atoms while pyruvic acid has 3 carbon atoms.

6. FAD and FADH₂ are functionally most similar to NAD⁺ and NADH, also in the Krebs cycle.

7. Electrons enter the electron transport system as a part of hydrogen atoms attached to NADH and FADH.

8. Energy released from electrons during electron transport is used to move H⁺ out of the matrix and into the intermembrane space of the mitochondrion. Energy stored in this way is then used to build ATP.

BIOCHEMISTRY

Match the following

- 1 a. glucose
- 2 b. triglyceride
- 2 c. cholesterol
- 4 d. DNA
- 1 e. starch
- 4 f. RNA
- 4 g. ATP
- 1 h. sucrose
- 3 i. enzymes
- 3 j. insulin
- 3 k. antibody

- 1. Carbohydrate
- 2. Lipid
- 3. Protein
- 4. Nucleic Acid

Match the following

- J 1. anabolic reaction
- C 2. active site
- E 3. activation energy
- D 4. catabolic reaction
- B 5. co-factor
- A 6. competitive inhibition
- F 7. end-product
- H 8. enzyme
- I 9. hydrogen ions H^+
- G 10. substrate
- K 11. competitive inhibitor

- a. A simple proton
- ~~b.~~ Substances that result from the action of an enzyme
- ~~c.~~ A portion of an enzyme that fits with a substrate
- ~~d.~~ The process of blocking the active site of an enzyme
- ~~e.~~ Energy that is required to initiate a chemical reaction
- ~~f.~~ A substance that attaches to the active site of an enzyme
- ~~g.~~ The process of breaking larger molecules into smaller ones
- ~~h.~~ Metallic atoms that work with an enzyme
- ~~i.~~ A protein that acts to reduce the activation energy of a reaction
- ~~j.~~ The process of building larger molecules from smaller ones
- k. A substance that competes for an enzyme's active site

DIGESTION

Match the following

- | | |
|--|----------------------------------|
| 1. <u>C</u> storage of bile | a. Liver |
| 2. <u>a</u> production of bile | |
| 3. <u>d</u> secretion of HCl | b. Pancreas |
| 4. <u> </u> stores food | |
| 5. <u>b</u> secretion of lipase | c. Gall bladder |
| 6. <u>h</u> grinds food <i>teeth</i> | |
| 7. <u>b</u> secretion of sucrase | d. Stomach |
| 8. <u>d</u> mixes food <i>churning</i> | |
| 9. <u>b</u> secretion of trypsin | e. Microvilli of small intestine |
| 10. <u>f</u> moves food into the stomach | |
| 11. <u>d</u> secretion of pepsinogen | f. Esophagus |
| 12. <u>a</u> detoxification of alcohol | |
| 13. <u>a</u> deamination of amino acids | g. Large intestine |
| 14. <u> </u> formation of clotting proteins <i>bone marrow</i> | |
| 15. <u>g</u> production of vitamins B and K | h. Mouth |
| 16. <u>b</u> secretion of sodium bicarbonate | |
| 17. <u>b</u> organ which manufactures amylase secreted into the duodenum | |
| 18. <u>b</u> the organ which regulates blood glucose levels with insulin | |
| 19. <u>g</u> absorption of water and minerals | |
| 20. <u>h/b</u> secretion of amylase | |
| 21. <u>a</u> conversion of excess glucose into glycogen | |
| 22. <u>e</u> absorption of nutrients into the blood vessels | |
| 23. <u>g</u> storage and distribution of vitamins A, B12 and D | |
| 24. <u>a</u> conversion of glycogen into glucose when needed | |
| 25. <u>h</u> digestion of starch | |

True or False

- T Secretin production is increased with an increased acidity of chyme (decreased pH)
- F Bile is a hormone that affects the digestion of fatty acids in the ~~liver~~ *small intestine*.
- T Most water used for digestion is reabsorbed by the lining of the large intestine
- T Most lipids are absorbed into the lacteals that run through the villi of the small intestine

CIRCULATION

True or False

1. Fluid can be exchanged between the ^{capillaries} arterioles and the tissues of the body ^{cells}
2. F The function of the lymph glands is to add fluid to the lymph vessels ^{make lymphocytes}
3. Osmotic pressure causes blood to ^{return to} exit at the capillaries
4. Systolic pressure is the pressure in the ^{arteries} veins when the ventricles are contracting
5. I Red blood cells are unable to leave the capillaries during capillary fluid exchange
6. I Normal blood pressure ranges between 110/70 and 120/80
7. I The blood pressure in an arteriole is higher than in a venule
8. I Pre-capillary sphincters are valves that are found inside capillaries
9. F The ^{aorta} carotid artery is the largest artery in the body
10. F Venules have a greater blood pressure than capillaries
11. F It is systolic and diastolic pressure that drives the capillary fluid exchange
fluid pressure and osmotic pressure

Starting from and ending with the heart, trace the blood flow through the human circulatory system by numbering the following in the correct order

- | | | | |
|----------|------------|----------|-------------|
| <u>1</u> | Heart | <u>4</u> | Capillaries |
| <u>6</u> | Veins | <u>2</u> | Arteries |
| <u>3</u> | Arterioles | <u>5</u> | Venules |

Starting from and ending with the right atrium, trace the flow of blood through the heart and body by numbering the following in the correct order.

- | | | | |
|-----------|------------------|----------|-----------------|
| <u>1</u> | right atrium | <u>7</u> | lungs |
| <u>6</u> | left atrium | <u>2</u> | right ventricle |
| <u>3</u> | pulmonary artery | <u>7</u> | left ventricle |
| <u>10</u> | vena cava | <u>9</u> | body cells |
| <u>8</u> | aorta | <u>5</u> | pulmonary veins |

What term best fits each of the following descriptions?

- vessels which carry blood away from the heart
- vessels which carry blood toward the heart
- tiny blood vessels with walls that are only once cell thick
- thick wall that divides the heart into two sides
- upper chambers of the heart that receive blood
- lower chambers of the heart that pump blood out of the heart
- valve between right atrium and right ventricle
- valve between left atrium and left ventricle
- valves found between the ventricles and blood vessels
- membrane around the heart
- the only artery in the body which is rich in carbon dioxide
- only vein in the body which is rich in oxygen

artery
veins
capillaries
septum
atrium
ventricle
atrioventricular valve (tricuspid)
" " (bicuspid)
semilunar valves
pericardium
pulmonary artery
pulmonary vein

Match the description in the right column with the correct term in the left column

- | | |
|-------------------------------|---|
| 1. <u>c</u> Plasma | a. iron containing molecule in red blood cells |
| 2. <u>e</u> Platelets | b. white blood cells which produce antibodies |
| 3. <u>b</u> Lymphocytes | c. liquid part of the blood |
| 4. <u>f</u> Antigens | d. returns tissue fluid to the blood |
| 5. <u>i</u> Fibrin | e. cell fragments involved in clotting |
| 6. <u>a</u> Hemoglobin | f. foreign molecules in the body |
| 7. <u>j</u> Antibodies | g. cancer of the bone marrow |
| 8. <u>h</u> Anemia | h. condition in which the blood cannot carry sufficient oxygen |
| 9. <u>g</u> Leukemia | i. strands of proteins involved in clotting |
| 10. <u>d</u> Lymphatic system | j. react with antigens and inactivates them |

Fill in the blanks with the correct answers.

The heart beats regularly because it has its own pacemaker. The pacemaker is a small region of muscle called the sinatrial, or SA node. It is in the upper back wall of the right atrium. The SA node triggers an impulse that causes both atria to contract. Very quickly, the impulse reaches the atrioventricular or AV node at the bottom of the right atrium. Immediately, the AV node triggers an impulse that causes both ventricles to contract.

RESPIRATION

Indicate whether the following actions or conditions contribute to inhalation or exhalation.

- a. During in air flows into the alveoli.
- b. During ex the thoracic cavity volume decreases.
- c. During in the pressure decreases in the thoracic cavity.
- d. During ex the diaphragm relaxes.
- e. During in the intercostal muscles contract.
- f. During in + ex there is an expenditure of metabolic energy.

True or False

- 1. F Vital lung capacity is greater than the total lung capacity. *Maximum amt of air that can be inhaled or exhaled*
- 2. T Residual volume is the volume of air that is in the lungs after inspiration. *all the air that the lungs can hold*
- 3. T Tidal volume is the volume of air that you use during normal breathing.
- 4. T Forced exhalation would account for the expiratory reserve volume.
- 5. F Oxyhemoglobin is the name of the hemoglobin molecule after it has released oxygen. *combined with*
- 6. 70% of the CO₂ that is transported in the blood is dissolved in the cytoplasm of red blood cells. *combines with water to form carbonic acid*
- 8. T Partial pressures of oxygen across the capillary affect the release of oxygen from oxyhemoglobin.
- 9. Oxygen is actively transported across the alveolar walls. *passively*

Multiple Choice

- 1. The surface area of a human lung is made larger by alveoli and is approximately the size of a
 - a. table
 - b. tennis court *1/2 a tennis court*
 - c. dinner plate
 - d. four-person tent
- 2. Breathing rate in mammals is controlled by a part of the brain called the
 - a. cortex
 - b. thalamus
 - c. hypothalamus
 - d. medulla oblongata
- 3. The breathing center in the brain responds most readily to changes in the
 - a. glucose in the mitochondria
 - b. acetyl coA in the mitochondrion
 - c. oxygen concentration of the blood
 - d. carbon dioxide concentration of the blood

Fill in the blanks

Gases move across membranes by diffusion. To move in this way the membranes must be permeable. Most carbon dioxide is transported in the blood in the form of HCO₃⁻ acid ions. Hydrogen ions formed when carbon dioxide enters the blood become attached to hemoglobin, so that the addition of carbon dioxide causes only a small decrease in blood pH. A mammal ventilates its lungs by moving its ribs and its diaphragm. The major, cartilage ringed, tube which carries air from the larynx is the trachea. This tube branches into two bronchi, then into many bronchioles and finally millions of alveoli.

EXCRETION

True or False

1. F The ureters carry ~~filtered blood~~ ^{urine} to the bladder.
2. Aldosterone is released by the ~~medulla oblongata~~ ^{adrenal glands}.
3. T Glucose and amino acids are filtered out of the blood in the glomerulus.
4. Secretion occurs as wastes move actively from the blood into the ~~collecting duct~~ ^{distal tubule}.
5. ~~Antidiuretic~~ ^{Aldosterone} hormone would cause the blood pressure to increase.
6. T The renal pyramids are found in the medulla area of the kidney.
7. F Sodium is ~~not~~ needed by the body and is ~~never~~ retained by the kidneys.
8. T The blood pressure within the glomerulus is higher than the blood pressure in the renal artery.
9. T The correct sequence of vessels is afferent arteriole, glomerulus, efferent arteriole, capillary network.
10. F Aldosterone causes kidney's tubules to become ~~less~~ ^{more} permeable to sodium.
11. T Glucose is moved out of the proximal convoluted tubule by active transport.
12. F The afferent arteriole is wider in diameter than the efferent arteriole.
13. Filtration is the movement of fluids containing wastes and nutrients from the ~~proximal convoluted tubules~~ ^{glomerulus} to the ~~glomerulus~~ ^{Bowman's capsule}.
14. F Amino acids are commonly found in a healthy person's urine.
15. F Glucose in the urine is a symptom of diabetes ~~insipidus~~ ^{melitus}.

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of your text

Multiple Choice

1. The basic unit of a vertebrate kidney is the
 - a. Ureter
 - b. Nephron**
 - c. Medulla
 - d. Pelvis
2. A mammal excretes nitrogen in the form of
 - a. ammonium ions
 - b. amino acids
 - c. urea**
 - d. lithium
3. About how many nephrons are there in each kidney of a human?
 - a. 16
 - b. 200

- c. 1 000
- d. 1 000 000

4. The force that moves fluid from the blood into the glomerulus is
- a. the beating of cilia
 - b. blood pressure
 - c. peristalsis of the capsule
 - d. active transport
5. Which components of the blood does NOT enter the nephron?
- a. ions
 - b. glucose
 - c. plasma proteins
 - d. urea

Fill in the Blanks

1. Each kidney releases urine into a ureter, which is a muscular tube that connects the kidney to the bladder, which in turn empties into the urethra, which carries urine to the outside of the body.
2. Adjustments in sodium concentration occur at the distal tubule of the nephron. Reabsorption of sodium ions is controlled by the hormone aldosterone, which is produced by the adrenal cortex.
3. Permeability of the collecting duct to water is controlled by the ADH hormone, which is released by the pituitary gland. When this hormone is abundant, the permeability of the duct to water is increased and a more concentrated urine is released. Large quantities of dilute urine form when a lot of alcohol or caffeine has been consumed, because these drugs inhibit the release of the hormone.

ECOLOGY

Multiple Choice

- Which of the following might best explain the disappearance of all life on earth? If all the
 - decomposers disappeared
 - producers disappeared ✓
 - consumers disappeared
 - hydrogen gas disappeared
- If decomposers did not exist on the earth, the only method of recycling carbon would be by subjecting organic material to
 - burning
 - burying
 - grinding
 - digestion
- An example of the primary consumers in a community are the
 - cats that eat moles
 - molds that cause decay
 - bacteria that live in the soil
 - rabbits that eat leaves and stems
- There are always fewer organisms at each higher step of the food pyramid because
 - each organism is larger than the previous
 - at each step the reproductive rate decreases
 - energy is lost as heat in each step of the pyramid
 - more organisms die at each higher level of the food chain
- If carbon dioxide were withdrawn from the biosphere, which organism would first experience negative effects?
 - producers
 - decomposers
 - primary consumers
 - secondary consumers
- Which of the following statements best describes the work done by decomposers?

- a. find calcium in plants and take it from the soil or water
 b. create new sources of oxygen and release free nitrogen
 c. prevent the escape of energy to outer space
 d. release carbon from dead bodies
7. Which best represents the normal flow of energy in a food chain?
 a. sparrow → seeds → hawk → bacteria
 b. hawk → seeds → bacteria → sparrow
 c. seeds → sparrow → hawk → bacteria
 d. sparrow → hawk → bacteria → seeds
8. In the pyramid of numbers there will always be
 a. more secondary consumers than primary consumers
 b. fewer secondary consumers than primary consumers *unless its inverted*
 c. more secondary consumers than producers
 d. more primary consumers than producers
9. Which organisms are most immediately essential to the existence of primary consumers?
 a. producers
 b. decomposers
 c. tertiary consumers
 d. secondary consumers
10. If the nitrogen fixing and nitrifying bacteria in the soil were destroyed, a probable result would be a reduction in available
 a. fats
 b. proteins
 c. disaccharides
 d. monosaccharides
11. Energy and nutrients enter a community by way of the
 a. producers
 b. consumers
 c. scavengers
 d. decomposers
12. A sequence of species through which the organic molecules in a community pass is called a
 a. food chain
 b. nutrient cycle
 c. pyramid of energy
 d. biogeochemical cycle
13. A consumer whose carbon atoms have already passed through three species is a
 a. scavenger
 b. tertiary producer
 c. tertiary consumer
 d. secondary consumer
14. About how much of the solar energy that falls on the leaves of a plant is converted to chemical energy by photosynthesis?
 a. 1% c. 30%
 b. 10% d. 50%
15. About how much of the chemical energy within producer tissues become chemical energy within herbivore tissue?
 a. 1% c. 30%
 b. 10% d. 50%

16. An ecological pyramid of biomass is a representation of the ecosystem's
- tissue at each trophic level
 - populations in each food web
 - energy flow through each trophic level
 - biologic material in relation to abiotic material
17. An ecological pyramid of energy flow is often an inverted pyramid in which of the following ecosystems?
- desert
 - ocean
 - tundra
 - rainforest
 - none, it cannot be inverted
18. The largest reservoir of phosphorus in the biosphere is the
- atmosphere
 - organisms
 - ocean
 - rocks
19. The main nitrogen reservoir in the biosphere is the
- atmosphere
 - organisms
 - ocean
 - rocks
20. An ecosystem is a
- a group of interacting chemicals and their cycles.
 - group of components that interact with one another.
 - group of interacting species in one place at one time.
 - biologic community and components of the physical environment with which the community interacts.

Matching

The next 6 items are concerned with the fact that living things can be divided into producers and consumers. Use the following key to classify the statements.

- KEY: A. Producers
 B. Consumers
 C. Both consumers and producers
 D. Neither consumers nor producers

- A Convert light energy into chemical energy
- A Supply food for consumers
- A Use the energy of sunlight to manufacture food
- A Have the ability to create energy
- B Organisms which cannot make their own food
- B Bread molds

The next 8 items concern the similarities and differences between matter and energy. Use the following key to classify these items.

- KEY: A. Matter
 B. Energy
 C. Both matter and energy
 D. Neither matter nor energy

- A Includes molecules which move in cycles from non-living to living things and back to living things
- D Moves from non-living materials to living things and stops there
- C Can be changed from one form to another by the activities of organisms
- C Can be passed from one organism to another
- B Is constantly being lost from the living system
- C Present in organic compounds

7. B Is returned from the living world to the non-living world in the form of heat
8. A The total quantity returned to the non-living world from the living world equals the amount transferred from the non-living to the living world

True or False

1. T Most of the world's greatest deserts are located near the 30° latitude lines.
2. T The region of the earth that supports life is called the ~~ionosphere~~ biosphere.
3. T Biomes are generally recognized by their important plant life.
4. T It requires about 100 cm of annual precipitation to support a temperate deciduous forest.
5. — The rate of decomposition in the soil is faster in the temperate deciduous forest than in any other biome. ^{+grassland}
6. T Primary producers of the tundra include mosses, lichens, and grasses.
7. T Light is a limiting factor in both the tundra and the taiga. ^{Canopy}
8. T One contributing factor to the success of the tropical rainforest is its extremely fertile soil.
9. T The energy entering a mature ecosystem is roughly equal to the energy leaving it.
10. T The difference between energy stored at one level and energy stored at the next is represented by heat loss.
11. — Carbon dioxide is known to retard the penetration of light in the atmosphere.
12. F Meteorologists can only theorize about changes in the atmosphere's carbon dioxide content.

Fill in the Blanks

1. All ecosystems have the same three categories of organisms: producers, which use abiotic sources of energy and nutrients to synthesize organic molecules; consumers, which acquire energy and nutrients by digesting the organic molecules of living organisms; and decomposers, which obtain energy and nutrients digesting the organic molecules of dead organisms, their excretions, and other organic (but no longer living) materials. Of the three categories, an ecosystem could persist without consumers (if even).
2. Energy enters an ecosystem primarily as sunlight and leaves an ecosystem primarily as heat. Within the ecosystem, it is transferred from organism to organism in the form of chemical energy.
3. Most of the available water in the biosphere is continually transformed between its liquid and gaseous forms and moves between the earth's surface and atmosphere. The water cycle, or hydrologic cycle, is driven by Solar energy and living organisms.
4. The greenhouse effect is caused by the addition of too much CO₂ into the atmosphere. Most of this extra material comes from the burning of fossil fuels.
5. The accumulation of trace elements, radioactive isotopes, and synthetic molecules in food chains is known as biological amplification. These materials, released in to the environment by human activities, accumulate because they are not eliminated, but other materials are, in the passage of molecules through food chains. The organisms most likely to be damaged by such accumulated materials are the ones at the top of the food chain.

