

BIOLOGY 20 COURSE REVIEW 2017

key

Match the function to the system.

- | | | | |
|----------|----|--------------------|---|
| <u>1</u> | a. | Circulatory system | 1. Transport of gases, sugars, and fluids throughout the body |
| <u>5</u> | b. | Digestive system | 2. Fights infections and foreign agents in the body |
| <u>6</u> | c. | Lymphatic system | 3. Exchanges gases between the environment and the body |
| <u>3</u> | d. | Respiratory system | 4. Filters fluids and wastes out of the blood with the kidney |
| <u>4</u> | e. | excretory system | 5. Breaks ingested materials into small chemical units |
| <u>2</u> | f. | Immune system | 6. Returns interstitial fluid to the blood |

PHOTOSYNTHESIS -Multiple Choice

1. An autotroph is an organism that
 - A. requires no input of materials from its environments
 - B. sustains itself without eating other organisms**
 - C. sustains itself without aerobic cellular respiration
 - D. uses ammonia instead of water as a solvent
2. An autotroph gets its carbon from
 - A. carbon dioxide**
 - B. methane
 - C. soil
 - D. organic molecules
3. A heterotroph is an organism that gets its energy from
 - A. heat
 - B. light
 - C. inorganic molecules
 - D. organic molecules**

4. A heterotroph gets its carbon from
- A. carbon dioxide
 - B. methane
 - C. soil
 - D. organic molecules**
5. Photosynthetic autotrophs get their energy from
- A. heat
 - B. light**
 - C. inorganic molecules
 - D. organic molecules
6. Which of the following equations is the correct summary of photosynthesis
- A. $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{LIGHT} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 +$**
 - B. $6\text{CO}_2 + 12\text{NH}_3 + \text{LIGHT} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{H}_2\text{N}_2$
 - C. $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O} + \text{LIGHT} \rightarrow 6\text{CO}_2 + 12\text{H}_2\text{O}$
 - D. $3\text{CO}_2 + 6\text{H}_2\text{O} + \text{LIGHT} \rightarrow \text{C}_3\text{H}_6\text{O}_3 + 3\text{O}_2 + 3\text{H}_2\text{O}$
7. In a plant cell, the light reactions of photosynthesis take place in the
- A. cytoplasm
 - B. endoplasmic reticulum
 - C. mitochondria
 - D. chloroplasts**
8. In a plant cell, the light independent reactions of photosynthesis take place in the
- A. cytoplasm
 - B. endoplasmic reticulum
 - C. mitochondria
 - D. chloroplasts**
9. Which of the following colors of light work(s) best for photosynthesis?
- A. green
 - B. yellow
 - C. blue and red**
 - D. violet and yellow
10. 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 "intra-thylakoid" 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. intermembrane space (between the inner and outer membranes)
 - C. thylakoid lumen
 - D. cytoplasm
- [Handwritten: H^+ with arrow pointing to C, and \hookrightarrow where are the most H^+]*
15. In photosynthesis, energy for attaching phosphate to ADP comes from
- A. oxidation of glucose
 - B. reduction of glucose
 - C. a proton gradient
 - D. formation of NADPH
16. The molecule in the Calvin-Benson cycle that combines with carbon dioxide is
- A. ADP
 - B. ribulose biphosphate
 - 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. CO_2
 - B. N_2
 - C. $\text{H}_2\text{O}_{(g)}$
 - D. O_2

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

Photosynthesis - *Fill in the Blanks*

1. Photosynthesis is the transformation of light energy to chemical energy.

Photosynthesis - *Fill in the Blanks Continued*

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

electrons 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
4. OMIT
5. During glycolysis, glucose is split into
- A. two pyruvic acid/pyruvate 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
 - 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. OMIT

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. OMIT

12. In aerobic cellular respiration, most of the ATP is synthesized during

- A. glycolysis
- B. oxidation of pyruvic acid
- C. Krebs cycle
- D. electron transport

13. 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

14. Glycolysis takes place

- A. within the chloroplast
- B. on the rough endoplasmic reticulum
- C. in the cytoplasm
- D. within the mitochondrion

15. 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

16. 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
 - B. ATP
 - C. pyruvic acid
 - D. glucose
17. Within the mitochondrion, the proton gradient develops across the
- A. inner membrane
 - B. outer membrane
 - C. intermembrane space
 - D. matrix
18. 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
19. 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

Cellular Respiration - *Fill in the Blanks*

1. Aerobic cellular respiration has three stages: glycolysis, Krebs cycle, and ETC.
2. OMIT
3. OMIT
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 FADH₂.
8. Energy released from electrons during electron transport is used to move H⁺ out of the matrix and into the inter-membrane 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
- g 4. catabolic reaction
- h 5. co-factor
- d ~~ch~~ 6. competitive inhibition
- b 7. end-product
- i 8. enzyme
- a 9. hydrogen ions
- f 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

ENZYMES

Multiple Choice

1. In enzyme is
 - A. carbohydrate
 - B. lipid
 - C. protein
 - D. nucleic acid
2. The function of an enzyme is to
 - A. cause chemical reactions that would not otherwise take place.
 - B. change the rates of chemical reactions.
 - C. control the equilibrium points of reactions.
 - D. change the directions of reactions.
3. The enzyme *sucrase* acts on
 - A. sucrose only
 - B. sucrose and starch
 - C. any disaccharide
 - D. any organic monomer
4. 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
 - A. coenzyme
 - B. cofactor
 - C. competitive inhibitor
 - D. allosteric modulator
5. An enzyme promotes a chemical reaction by
 - A. lowering the energy of activation.
 - B. causing the release of heat, which acts as a primer.
 - C. changing the free energy difference between substrate and product
 - D. increasing molecular motion and therefore increasing molecular collisions
6. In feedback inhibition, a metabolic pathway is switched off by
 - A. a rise in temperature
 - B. lack of a substrate
 - C. accumulation of the end product
 - D. competitive inhibition

Enzymes - Fill in the Blanks

1. 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 enzyme.

2. 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.

3. A metabolic pathway is a sequence of reactions, in which each step is controlled by its own specific enzyme.

4. Metabolism involves two kinds of processes: catabolic in which larger molecules are broken down into smaller ones, and anabolic, in which larger molecules are built from smaller ones. During growth, the rate of the anabolism process exceeds the rate of the catabolism process.

DIGESTION

Match the following

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

True or False

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

CIRCULATION

True or False

1. T Fluid can be exchanged between the arterioles and the tissues of the body
2. F The function of the lymph glands is to add fluid to the lymph vessels
3. F ^{Fluid} Osmotic pressure causes blood to exit at the capillaries
4. T Systolic pressure is the pressure in the veins when the ventricles are contracting
5. T Red blood cells are unable to leave the capillaries during capillary fluid exchange
6. T Normal blood pressure ranges between 110/70 and 120/80
7. T The blood pressure in an arteriole is higher than in a venule
8. F Pre-capillary sphincters are valves that are found inside capillaries
9. F The 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

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> Venule |

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.

1 right atrium

6 left atrium

3 pulmonary artery

10 vena cava

8 aorta

4 lungs

2 right ventricle

7 left ventricle

9 body cells

5 pulmonary veins

What term best fits each of the following descriptions?

1. vessels which carry blood away from the heart arteries
2. vessels which carry blood toward the heart veins
3. tiny blood vessels with walls that are only once cell thick capillaries
4. thick wall that divides the heart into two sides septum
5. upper chambers of the heart that receive blood atria
6. lower chambers of the heart that pump blood out of the heart ventricles
7. valve between right atrium and right ventricle AV valve tricuspid
8. valve between left atrium and left ventricle AV valve bicuspid mitral
9. valves found between the ventricles and blood vessel semilunar
10. the only artery in the body which is rich in carbon dioxide pulmonary
11. only vein in the body which is rich in oxygen pulmonary

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 |

Circulation - 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 sinoatrial, 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.

GAS EXCHANGE

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

- During I air flows into the alveoli.
- During E the thoracic cavity volume decreases.
- During I the pressure decreases in the thoracic cavity.
- During E the diaphragm relaxes.
- During I the intercostal muscles contract.
- During I there is an expenditure of metabolic energy.

True or False

- F Vital lung capacity is ^{less} greater than the total lung capacity.
- F Residual volume is the volume of air that is in the lungs after ^{ex} inspiration.
- T Tidal volume is the volume of air that you use during normal breathing.
- T Forced exhalation would account for the expiratory reserve volume.
- F Oxyhemoglobin is the name of the hemoglobin molecule after it has ^{released} ~~released~~ oxygen. _{gained}
- T 70% of the CO₂ that is transported in the blood is dissolved in the cytoplasm of red blood cells.
- T 99% of the oxygen transported in the blood combines with hemoglobin within the red blood cell.
- T Partial pressures of oxygen across the capillary affect the release of oxygen from oxyhemoglobin.
- F Oxygen is ^{possibly} actively transported across the alveolar walls.
- F Carbon ^{mon} dioxide acts as a competitive inhibitor with hemoglobin in the red blood cell.

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**
 - 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 HCO_3^- 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 ribcage 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 ^{urine} ~~filtered blood~~ to the bladder.
2. F Aldosterone is released by the medulla oblongata. ^{adrenal gland}
3. T Glucose and amino acids are filtered out of the blood in the glomerulus.
4. T Secretion occurs as wastes move actively from the blood into the collecting duct. ^{+ distal tubule}
5. T Antidiuretic hormone would cause the blood pressure to increase. ^{b/c more fluid is reabsorbed}
6. ~~OMIT~~ F The renal pyramids are found in the ^{cortex} ~~medulla~~ area of the kidney.
7. F Sodium is not needed by the body and is never retained by the kidneys.
8. ~~_____~~ 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 ^{more} ~~less~~ permeable to sodium.
11. T Glucose is moved out of the proximal convoluted tubule by active transport.
12. ~~_____~~ The afferent arteriole is wider in diameter than the efferent arteriole.
13. F Filtration is the movement of fluids containing wastes and nutrients from the proximal convoluted tubules ~~to the glomerulus.~~ ^{to the nephron}
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.~~ ^{mellitus}

Excretion - *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 _____ 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

anti-diabetic
ADH

hormone, which is released by the pituitary gland.

When this hormone is abundant, the permeability of the duct to water is ↑ 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*

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

6. 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
 - 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%
 - B. 10%
 - C. 30%
 - D. 50%
15. About how much of the chemical energy within producer tissues become chemical energy within herbivore tissue
- A. 1%
 - B. 10%
 - C. 30%
 - D. 50%
16. An ecological pyramid of biomass is a representation of the ecosystem's
- A. tissue at each trophic level
 - B. populations in each food web
 - C. energy flow through each trophic level
 - D. biologic material in relation to abiotic material

17. An ecological pyramid of biomass is often an inverted pyramid in which of the following ecosystems?

- A. desert
- B. ocean
- C. tundra
- D. rainforest

18. The largest reservoir of phosphorus in the biosphere is the

- A. atmosphere
- B. organisms
- C. ocean
- D. rocks

19. The main nitrogen reservoir in the biosphere is the

- A. atmosphere
- B. organisms
- C. ocean
- D. rocks

20. An ecosystem is a

- A. a group of interacting chemicals and their cycles.
- B. group of components that interact with one another.
- C. group of interacting species in one place at one time.
- D. biologic community and components of the physical environment with which the community interacts.

Ecology - 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

1. A Convert light energy into chemical energy
2. C Supply food for consumers
3. A Use the energy of sunlight to manufacture food
4. D Have the ability to create energy
5. B Organisms which cannot make their own food
6. 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

1. A Includes molecules which move in cycles from non-living to living things and back to living things
2. D Moves from non-living materials to living things and stops there
3. C Can be changed from one form to another by the activities of organisms
4. C Can be passed from one organism to another
5. B Is constantly being lost from the living system
6. 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

Ecology - True or False

1. T Most of the world's greatest deserts are located near the 30° latitude lines.
2. F The region of the earth that supports life is called the ^{bio}ionosphere.
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. F The rate of decomposition in the soil is faster in the ^{com}temperate deciduous forest than in any other biome.
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.

8. F 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. F 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.

Ecology - *Fill in the Blanks*

1. All ecosystems have the same three categories of organisms:
 - autotrophs
producers, which use abiotic sources of energy and nutrients to synthesize organic molecules; heterotrophs
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/heterotrophs.
2. Energy enters an ecosystem primarily as light and leaves an ecosystem primarily as heat. Within the ecosystem, it is transferred from organism to organism in the form of chemical energy.

3. Unlike energy, atoms are not altered by their use and so are cycled repeatedly between the biotic and the abiotic components of an ecosystem.
4. Carbon enters a biologic community as CO₂ during photosyn. and leaves mainly as CO₂ during decomp./cell resp.
5. 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 heat.
6. 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.
7. The accumulation of trace elements, radioactive isotopes, and synthetic molecules in food chains is known as biological accumulation. 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.

EVOLUTION - Multiple Choice

1. A rat loses its tail. Those who believe that the rat's offspring will be born without tails are following the doctrine of
 - A. mutation
 - B. natural selection
 - C. survival of the fittest
 - D. inheritance of acquired characteristics
2. In man, the appendix and ear muscles are examples of
 - A. vestigial organs
 - B. homology
 - C. natural selection
 - D. mutations
3. Most fossils are found in
 - A. granite
 - B. black soil
 - C. lava flows
 - D. sedimentary rocks
4. A turtle has a trait that gives it a survival advantage. Over time, the percentage of this trait in the population increased. This is probably due to
 - A. mutation
 - B. use and disuse
 - C. natural selection
 - D. artificial selection
5. Darwin described natural selection as
 - A. environmental stimuli resulting in changes in body structure
 - B. inheritance of environmentally acquired characteristics
 - C. a stable unchanging population of animals
 - D. survival value of random differences
6. Lamarck believed certain parts of the body get larger and more complex through the generations because they.
 - A. are used more extensively than other parts.
 - B. contribute to greater reproductive success.
 - C. are predetermined to do so.
 - D. formed from part of another planet.

7. If we assume that species do not change, we would expect
- A. the most complex fossils only in the oldest rocks
 - B. the simplest fossils only in the newest rocks
 - C. the same kind of fossils in both old and new rocks
 - D. no fossils of any kind in any rocks
8. Evolution can occur more rapidly among organisms which reproduce sexually than among organisms which reproduce asexually because
- A. Sexual reproducers are more prone to disease and infection than asexual reproducers, hence only the fit survive.
 - B. Asexual reproduction is only possible for single celled organisms.
 - C. Sexual reproduction is more likely to produce a variety of offspring.
 - D. Asexual reproduction is faster than sexual reproduction.
9. A new species is formed when
- A. a series of mutations occurs to cause an organism to appear physiologically different in a population.
 - B. an organism is isolated from the rest of the species by a geographic barrier.
 - C. the climate of a population changes drastically.
 - D. a group of organisms can no longer interbreed with other closely related organisms to produce fertile offspring.
10. A large number of dark and light forms of moths were captured and marked for identification. 488 dark moths and 496 light moths were released. 34 dark moths and 62 light moths were recaptured. Which of the following would be the most reasonable assumption?
- A. The moths were released in a forest with dark tree trunks.
 - B. The moths were released in a forest which had many light tree trunks.
 - C. The recaptured moths were too few in number to draw a conclusion.
 - D. Since unequal numbers of moths were released, a conclusion cannot be drawn.

Evolution - *Fill in the Blanks*

1. The binomial system of classification names every kind of organism according to genus and species. The branch of biology devoted to naming and classifying organisms is taxonomy.

2. Darwin was influenced by Thomas Malthus, who, in 1798, wrote that populations have the potential to increase exponentially, whereas their resources will not.
3. Natural selection operates only on heritable traits.
4. Much of the evidence in support of evolution is in the form of fossils, studied by paleontologists.
5. Evolved features that make organisms better suited to live and reproduce in their environments are called adaptation.
6. An important addition to Darwin's work was the discovery that mutations occur, providing a source for the observed inherited variations.

Evolution - True or False

1. F According to Lamarck, a giraffe has a long neck because a Creator designed it that way
2. F Darwin believed that a giraffe has a long neck because a Creator designed it that way
3. T Darwin believed that two different areas within a continent have different species because they have different environments.
4. T Darwin did not actually use the word "Evolution" in his book *On the Origin of Species*.
5. F The struggle for existence is a consequence of the inevitable difficulty of coping with climatic conditions.
6. T The wings of a bird and the forelegs of a horse are homologous structures.
7. F The wing of a bird and the wings of an insect are homologous structures.
8. T The pelvis and the leg bones of a snake are vestigial structures.