

NAME: _____ DATE: _____ SECTION: _____

MCAS PREP PACKET – ANATOMY AND PHYSIOLOGY

1. Into which parts of the digestive system are digestive enzymes secreted?
 - a.) mouth, esophagus, stomach
 - b.) stomach, small intestine, large intestine
 - c.) mouth, stomach, small intestine
 - d.) esophagus, stomach, large intestine

2. Lipase aids in the chemical digestion of
 - a.) fats
 - b.) proteins
 - c.) enzymes
 - d.) salts

3. Blood is carried from the heart to all parts of the body in thick-walled vessels known as
 - a.) capillaries
 - b.) lymph vessels
 - c.) veins
 - d.) arteries

4. The process most directly involved in the exchange of gases between the air sacs and blood vessels is called
 - a.) active transport
 - b.) osmosis
 - c.) diffusion
 - d.) hydrolysis

5. The alveoli in humans are structures most closely associated with
 - a.) gas exchange
 - b.) anaerobic respiration
 - c.) glandular secretion
 - d.) neural transmission

6. The exchange of air between the human body and the environment is a result of the rhythmic contractions of the rib cage muscles and the
 - a.) lungs
 - b.) trachea
 - c.) heart
 - d.) diaphragm

7. Which human body system includes the lungs, liver, skin, and kidneys?
 - a.) respiratory
 - b.) digestive
 - c.) integumentary
 - d.) excretory

8. In humans, urine is eliminated from the bladder through the

- a.) ureter
- b.) urethra
- c.) kidneys
- d.) large intestine

9. The brain and the spinal cord make up the

- a.) peripheral nervous system
- b.) autonomic nervous system
- c.) central nervous system
- d.) somatic nervous system

10. Which type of connective tissue makes up the greatest proportion of the skeleton of a human embryo?

- a.) ligaments
- b.) cartilage
- c.) tendons
- d.) bone

11. Which of the following is a correct order in which air moves through the human respiratory system when a person inhales?

- a.) nasal cavity, trachea, pharynx, bronchi, alveoli, bronchioles
- b.) pharynx, nasal cavity, trachea, bronchi, bronchioles, alveoli
- c.) nasal cavity, pharynx, esophagus, bronchi, bronchioles, alveoli
- d.) nasal cavity, pharynx, trachea, bronchi, bronchioles, alveoli

12. Which cells are important components of the human immune system?

- a.) red blood cells
- b.) liver cells
- c.) white blood cells
- d.) neurons

13. Which of the following is the basic structural unit of the nervous system?

- a.) neuron
- b.) axon
- c.) endocrine glands
- d.) dendrites

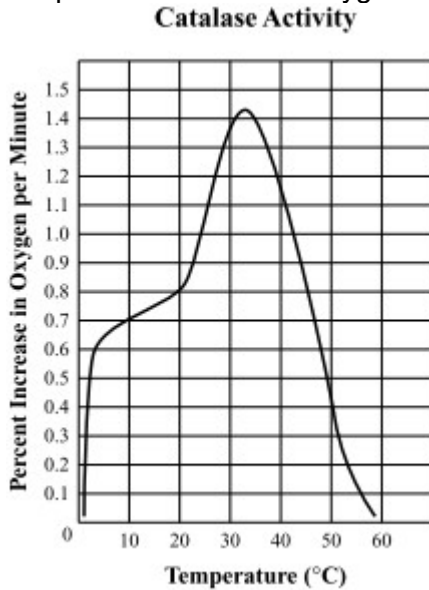
14. In which organ's walls does peristalsis occur?

- a.) liver
- b.) pancreas
- c.) oral cavity
- d.) esophagus

15. A person who consumes large amounts of saturated fats may increase his or her chances of developing

- a.) meningitis
- b.) hemophilia
- c.) pneumonia
- d.) cardiovascular disease

16. 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.



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.

17 Which of the following elements is **most** common in the tissues of plants?

- A. hydrogen
- B. iron
- C. potassium
- D. sodium

18. Which of the following **best** explains why enzymes are necessary for many cellular reactions?

- A. Enzymes supply the oxygen necessary for the reactions.
- B. Enzymes change reactants from solid to liquid during the reactions.
- C. The reactions take up too much space in the cell if enzymes are missing.
- D. The reactions are too slow to meet the needs of the cell if enzymes are missing.

19. Ovalbumin is a protein found in eggs. Which of the following **best** describes the molecular structure of ovalbumin?

- A. a group of six carbon atoms joined in a ring
- B. a chain of amino acids folded and twisted into a molecule
- C. a set of three fatty acids attached to a molecule of glycerol
- D. a sequence of nitrogenous bases attached to a sugar-phosphate backbone

20. Lemurs' bodies are adapted to efficiently store energy for times when food is scarce. This adaptation may help to explain how lemur ancestors survived the trip across the Mozambique Channel from mainland Africa to Madagascar.

Which of the following types of molecules are primarily used for long-term energy storage in the lemur?

- A. lipids
- B. monosaccharides
- C. nucleic acids
- D. proteins

21. Baby food manufacturers sometimes use proteases in their products. Proteases catalyze the breakdown of the proteins in these foods, making digestion easier for infants.

Proteases are which of the following types of molecules?

- A. enzymes
- B. fatty acids
- C. hormones
- D. monosaccharides

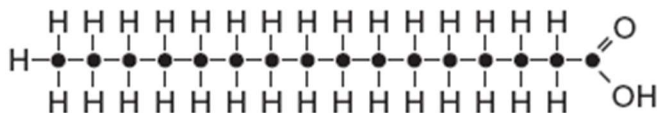
22. In the human body, fibrinogen is necessary for sealing cuts and stopping the loss of blood. Since fibrinogen is made of chains of amino acids, it is an example of which type of organic molecule?

- A. carbohydrate
- B. protein
- C. fatty acid
- D. nucleic acid

23. A scientist is analyzing a sample of tissue from a plant. Which of the following elements will be most abundant in the sample?

- A. zinc and copper
- B. sodium and chlorine
- C. carbon and hydrogen
- D. magnesium and calcium

24. A diagram of an organic molecule is below.



Which element is found at the positions marked by the dots (•) in the molecule?

- A. carbon
- B. nitrogen
- C. phosphorus
- D. sulfur

25. Students in a biology laboratory are monitoring the rate at which hydrogen peroxide breaks down to produce water and oxygen gas. They begin monitoring a sample of hydrogen peroxide and then add catalase, an enzyme that speeds up its breakdown. Their data are shown in the table below.

Time (min)	Rate of Hydrogen Peroxide Breakdown (molecules per min)
0.0	0
0.5	0.030
1.0	0.032
1.5	4,970,000
2.0	5,001,000
2.5	4,985,300
3.0	5,021,700

Based on the data in this table, during which of the following time periods did the students add the catalase to the hydrogen peroxide?

- A. between 0.0 and 0.5 min
 - B. between 1.0 and 1.5 min
 - C. between 2.0 and 2.5 min
 - D. between 2.5 and 3.0 min
26. 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.
27. In red blood cells, the compound carbonic anhydrase increases the rate at which carbon dioxide is converted to bicarbonate ions for transport in the blood. In red blood cells, carbonic anhydrase acts as which of the following?
- A. An enzyme
 - B. A hormone
 - C. A lipid
 - D. A sugar
28. If scientists search other planets for possible life, they are likely to focus on the presence of molecules containing which of the following elements?
- A. carbon
 - B. iron
 - C. potassium
 - D. sodium

29. Many plants have waxy coatings on some surfaces. This coating reduces water loss because it is not water-permeable. This waxy coating is which of the following types of organic molecule?

- A. carbohydrate
- B. lipid
- C. nucleic acid
- D. protein

30. The molecule ATP is composed of elements commonly found in organic molecules. Which of the following is one of these elements?

- A. aluminum
- B. calcium
- C. phosphorus
- D. tin

31. The illustration below shows a Siamese cat.

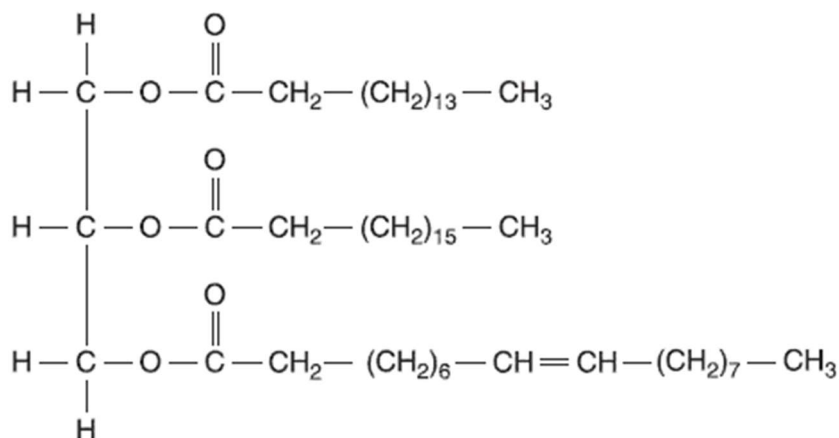


In Siamese cats, an enzyme determines the color of the fur. On the cooler places of the body, the enzyme causes darker fur. On the warmer parts of the body, the enzyme does not function.

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.

32. The diagram below represents a fat molecule.



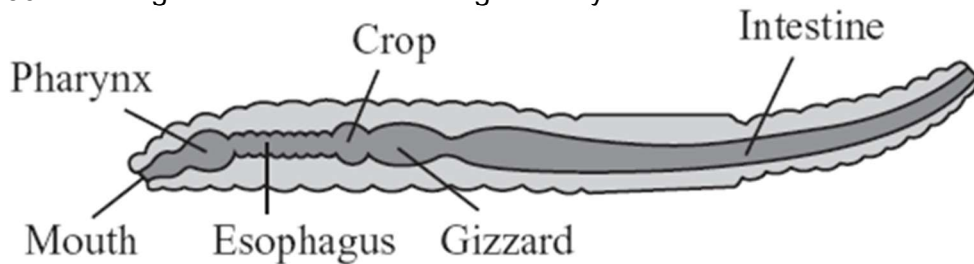
A fat molecule belongs to which category of organic molecules?

- A. proteins
- B. lipids
- C. nucleic acids
- D. carbohydrates

33. 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.

First, every time a person breathes they take air into their body. During exercise, the breathing rate speeds up so that more air can be taken in. In the lungs, the air is filtered and the oxygen molecules in it taken out to be used in the process of respiration. The lungs pass this oxygen to red blood cells in the capillaries passing through them. These blood cells are now oxygenated and pass through the circulatory systems arteries, pumped by the heart, which, during exercise, like the respiratory system, works twice as hard as usual so that the oxygenated blood cells pass quickly through the body. Once the oxygenated red blood cells reach the muscle cells involved in the exercise, they release the oxygen they were carrying. This oxygen passes through the muscle cells' cell membranes in the process of diffusion - in this way, the cell doesn't have to expend extra energy in order to receive a material needed to produce energy. The oxygen moves to the mitochondria, where it is used in the process of respiration to take some compounds and produce H_2O and, most importantly, ATP, which is then used in exercise.

36. The diagram below shows the digestive system of an earthworm.



Identify **three** digestive organs in the earthworm that are also found in the human body. Describe the function that **each** organ you identified in part (a) has in the human body.

SCORE POINT 4:

A) The three digestive organs that an earthworm and a human have in common are the mouth, the esophagus and the intestines.

B) The function of the mouth in the human body is to produce enzymes in the saliva to begin breaking down food, and also to mechanically begin breaking down food into smaller particles. The function of the esophagus is to push food particles into the stomach, this action is an involuntary muscle contraction. The function of the small & large intestines is to drain and absorb nutrients and liquids from the digested food to create waste.