BIOL-8 Exam 03

Modules 12-15: Muscular System through Respiratory System

Date: Tuesday, April 7, 2026
Time: 5:30 PM - 8:40 PM
Total Points: 100

Part A: Multiple Choice (50 points)

Choose the best answer for each question. Each question is worth 2 points.

Module 12: Muscular System

1. The functional unit of skeletal muscle contraction is the:
2. A) Myofibril
3. B) Sarcomere
4. C) Muscle fiber
5. D) Fascicle
6. Which proteins make up the thick filaments in muscle?
7. A) Actin
8. B) Myosin
9. C) Troponin
10. D) Tropomyosin
11. According to the sliding filament theory, muscle contraction occurs when:
12. A) Filaments shorten
13. B) Filaments slide past each other

14. C) Sarcomeres lengthen

15. D) Z-lines move apart

16. The neurotransmitter released at the neuromuscular junction is:

17. A) Epinephrine
18. B) Dopamine
19. C) Acetylcholine

20. D) Serotonin

21. Which ion is essential for triggering muscle contraction?

22. A) Sodium
23. B) Potassium
24. C) Calcium

25. D) Chloride

26. Type I (slow-twitch) muscle fibers are characterized by:

27. A) Fast contraction and quick fatigue
28. B) Low myoglobin content
29. C) High endurance and resistance to fatigue
30. D) Few mitochondria

Module 13: Pathogens

1. Which type of pathogen is NOT considered living by most biologists?
2. A) Bacteria
3. B) Fungi
4. C) Viruses

5. D) Protozoa

6. Antibiotics are effective against:

7. A) Viruses
8. B) Bacteria
9. C) Prions
10. D) All pathogens
11. The viral life cycle in which the virus immediately replicates and destroys the host cell is called the:
12. A) Lysogenic cycle
13. B) Lytic cycle
14. C) Dormant cycle
15. D) Reproductive cycle
16. Which type of pathogen causes diseases like athlete's foot and ringworm?
    - A) Bacteria
    - B) Viruses
    - C) Fungi
    - D) Prions
17. The body's first line of defense against pathogens includes:
    - A) White blood cells
    - B) Antibodies
    - C) Skin and mucous membranes
    - D) Fever
18. Antibiotic resistance develops primarily because:
    - A) Antibiotics become weaker over time
    - B) Bacteria that survive antibiotic treatment reproduce
    - C) Viruses transfer resistance to bacteria
    - D) The human immune system weakens

Module 14: Cardiovascular System

1. Blood returning from the body enters the heart through the:

    - A) Left atrium
    - B) Right atrium
    - C) Left ventricle
    - D) Right ventricle

2. The correct path of blood through the heart is:

    - A) Right atrium → Left atrium → Right ventricle → Left ventricle
    - B) Right atrium → Right ventricle → Left atrium → Left ventricle
    - C) Left atrium → Right atrium → Left ventricle → Right ventricle
    - D) Left ventricle → Left atrium → Right ventricle → Right atrium

3. The pacemaker of the heart is the:

    - A) AV node
    - B) SA node
    - C) Bundle of His
    - D) Purkinje fibers

4. Which blood vessels have valves to prevent backflow?

    - A) Arteries
    - B) Capillaries
    - C) Veins
    - D) Arterioles

5. Gas exchange occurs in which blood vessels?

    - A) Arteries
    - B) Capillaries
    - C) Veins
    - D) Arterioles

6. The "lub" sound of the heartbeat is caused by:

    - A) Closing of the semilunar valves
    - B) Closing of the atrioventricular valves
    - C) Opening of the semilunar valves
    - D) Blood rushing through arteries

7. Systolic pressure measures pressure during:

    - A) Ventricle relaxation
    - B) Ventricle contraction
    - C) Atrial relaxation
    - D) Diastole

Module 15: Respiratory System

1. Gas exchange in the lungs occurs in the:

    - A) Bronchi
    - B) Bronchioles
    - C) Alveoli
    - D) Trachea

2. The diaphragm is a dome-shaped muscle that:

    - A) Closes the epiglottis during swallowing
    - B) Contracts and flattens during inhalation
    - C) Produces surfactant
    - D) Warms and moistens air

3. Most oxygen is transported in the blood:

    - A) Dissolved in plasma
    - B) Bound to hemoglobin
    - C) As bicarbonate ions
    - D) In white blood cells

4. The primary stimulus for breathing is:

    - A) Low oxygen levels
    - B) High carbon dioxide levels
    - C) High oxygen levels
    - D) Low carbon dioxide levels

5. Surfactant is important because it:

    - A) Traps pathogens
    - B) Reduces surface tension in alveoli
    - C) Warms incoming air
    - D) Produces mucus

6. External respiration refers to:

    - A) Gas exchange between blood and tissues
    - B) Gas exchange between alveoli and blood
    - C) Cellular respiration
    - D) Breathing movements

Part B: Short Answer (30 points)

Answer each question in 2-4 sentences. Each question is worth 5 points.

1. Describe the sliding filament theory of muscle contraction, including the roles of actin, myosin, and ATP.

2. Compare the lytic and lysogenic viral life cycles.

3. Explain why antibiotics are ineffective against viral infections.

4. Trace the path of blood through the heart, starting from the right atrium and ending at the aorta.

5. Describe how the mechanics of breathing (inspiration and expiration) work, including the role of the diaphragm.

6. Explain how oxygen and carbon dioxide are transported in the blood.

Part C: Essay Questions (20 points)

Choose ONE of the following essay questions. Write a well-organized response of at least one page.

Option A: Describe how the muscular, cardiovascular, and respiratory systems work together during exercise. Include how each system responds to increased metabolic demands.

Option B: Discuss how the body defends itself against pathogens. Include first-line defenses, the inflammatory response, and provide examples of how different types of pathogens evade these defenses.

End of Exam 03