

# Ivy Tech APHY 101 - Muscle System Practice Test (Sample)

## Study Guide



**Everything you need from our exam experts!**

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# Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

**Remember:** successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

# How to Use This Guide

**This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:**

## **1. Start with a Diagnostic Review**

**Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.**

## **2. Study in Short, Focused Sessions**

**Break your study time into manageable blocks (e.g. 30 - 45 minutes). Review a handful of questions, reflect on the explanations.**

## **3. Learn from the Explanations**

**After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.**

## **4. Track Your Progress**

**Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.**

## **5. Simulate the Real Exam**

**Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.**

## **6. Repeat and Review**

**Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.**

**There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!**

## Questions

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- 1. The thick filaments run the entire length of an A band and are composed of which protein?**
  - A. Actin**
  - B. Myosin**
  - C. Titin**
  - D. Nebulin**
  
- 2. What initiates Ca<sup>2+</sup> release from the sarcoplasmic reticulum in skeletal muscle?**
  - A. Voltage-sensitive proteins in T tubules stimulate Ca<sup>2+</sup> release from terminal cisternae of SR**
  - B. Direct diffusion of Ca<sup>2+</sup> from extracellular space**
  - C. Binding of Ca<sup>2+</sup> to troponin triggers release**
  - D. Activation of myosin ATPase**
  
- 3. What term describes a bundle of muscle fibers surrounded by perimysium?**
  - A. Fascicle**
  - B. Endomysium**
  - C. Myofibril**
  - D. Tendon**
  
- 4. Regular resistance exercise increases muscle force by causing muscle cells to increase in size, a process known as hypertrophy.**
  - A. Hyperplasia**
  - B. Hypertrophy**
  - C. Atrophy**
  - D. Dystrophy**
  
- 5. The wasting away of a body organ or tissue is called?**
  - A. Hypertrophy**
  - B. Hyperplasia**
  - C. Atrophy**
  - D. Dystrophy**

- 6. Formed in muscle fibers by myofilaments of actin and myosin arranged in an organized manner; composed of hundreds of sarcomeres end-to-end**
- A. Myofibril**
  - B. Sarcomere**
  - C. Tendon**
  - D. Fascicle**
- 7. What percentage of ATP used by muscle activity comes from aerobic respiration?**
- A. 50%**
  - B. 75%**
  - C. 95%**
  - D. 100%**
- 8. What is described as cross-bridge formation in the cycle?**
- A. High-energy myosin head attaches to actin of the thin filament**
  - B. Myosin head pivots and pulls the thin filament**
  - C. ATP binds to the myosin head causing detachment**
  - D. Tropomyosin moves to block actin binding sites**
- 9. What forms the cross-bridge by binding to actin during contraction?**
- A. Myosin**
  - B. Actin**
  - C. Tropomyosin**
  - D. Troponin**
- 10. Ions move across a membrane down an electrical gradient toward an opposite charge and/or down a chemical gradient to an area of lower solute concentration. This movement is described as the**
- A. Electrochemical gradient**
  - B. Diffusion**
  - C. Osmosis**
  - D. Active transport**

## Answers

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1. B
2. A
3. A
4. B
5. C
6. A
7. C
8. A
9. A
10. A

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## **Explanations**

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**1. The thick filaments run the entire length of an A band and are composed of which protein?**

- A. Actin
- B. Myosin**
- C. Titin
- D. Nebulin

Thick filaments in skeletal muscle are built from myosin molecules. Each myosin has a long tail that forms the filament's backbone and protruding heads that form cross-bridges with actin during contraction. The A band corresponds to the length of the thick filament, so these thick filaments run the entire length of the A band. Actin is the thin filament (found primarily in the I band and at the overlapping region within the A band), titin helps anchor thick filaments and provides elasticity, and nebulin helps align thin filaments. So the protein that makes up the thick filaments is myosin.

**2. What initiates Ca<sup>2+</sup> release from the sarcoplasmic reticulum in skeletal muscle?**

- A. Voltage-sensitive proteins in T tubules stimulate Ca<sup>2+</sup> release from terminal cisternae of SR**
- B. Direct diffusion of Ca<sup>2+</sup> from extracellular space
- C. Binding of Ca<sup>2+</sup> to troponin triggers release
- D. Activation of myosin ATPase

Depolarization of the T-tubule membrane triggers Ca<sup>2+</sup> release from the sarcoplasmic reticulum. When an action potential travels along the muscle fiber, voltage-sensitive proteins in the T tubules (the dihydropyridine receptors) respond to the change in membrane potential and mechanically couple to ryanodine receptors on the SR's terminal cisternae. This coupling opens the Ca<sup>2+</sup> channels in the SR, releasing Ca<sup>2+</sup> into the cytosol. This Ca<sup>2+</sup> release is what starts the contraction process by allowing Ca<sup>2+</sup> to bind troponin and move tropomyosin away from actin's binding sites, enabling cross-bridge cycling. The other options don't initiate release: Ca<sup>2+</sup> diffusion from outside the cell isn't the trigger in skeletal muscle, Ca<sup>2+</sup> binding to troponin happens after Ca<sup>2+</sup> is released, and myosin ATPase activation occurs during contraction after Ca<sup>2+</sup> has risen.

**3. What term describes a bundle of muscle fibers surrounded by perimysium?**

- A. Fascicle**
- B. Endomysium
- C. Myofibril
- D. Tendon

A fascicle is a bundle of muscle fibers wrapped by perimysium. This layer of connective tissue organizes several fibers into a cohesive unit and houses the blood vessels and nerves that supply those fibers. Inside each fascicle, each muscle fiber is surrounded by endomysium, and within each fiber lie the myofibrils—the contractile elements. The whole muscle is wrapped by an outer epimysium, and the tendon that connects muscle to bone is formed from dense regular connective tissue that continues from these coverings. So the bundle described by perimysium is a fascicle.

**4. Regular resistance exercise increases muscle force by causing muscle cells to increase in size, a process known as hypertrophy.**

- A. Hyperplasia
- B. Hypertrophy**
- C. Atrophy
- D. Dystrophy

When muscles adapt to regular resistance work, the fibers grow larger by adding more contractile proteins and sarcomeres in parallel. This increase in the size of individual muscle cells is called hypertrophy, and it boosts force by enlarging the muscle's cross-sectional area. Hyperplasia would mean more muscle cells, which isn't the typical response to resistance training in humans. Atrophy is the opposite—a decrease in size from disuse or aging. Dystrophy refers to a degenerative disease of the muscles. So the described process is hypertrophy.

**5. The wasting away of a body organ or tissue is called?**

- A. Hypertrophy
- B. Hyperplasia
- C. Atrophy**
- D. Dystrophy

Atrophy is the shrinking of a tissue or organ, usually from cells getting smaller (or fewer in number) due to reduced use, aging, poor nutrition, or nerve damage. This explains the “wasting away” idea. Hypertrophy is an increase in cell size, hyperplasia is an increase in cell number, and dystrophy refers to degenerative disease of tissue. So the wasting away described is atrophy.

**6. Formed in muscle fibers by myofilaments of actin and myosin arranged in an organized manner; composed of hundreds of sarcomeres end-to-end**

- A. Myofibril**
- B. Sarcomere
- C. Tendon
- D. Fascicle

Inside a muscle fiber, the contractile engine is a myofibril. Myofibrils are long, rod-like structures made up of myofilaments—actin and myosin—organized into repeating units called sarcomeres. When hundreds of these sarcomeres align end-to-end along a single myofibril, they form a long chain that runs the length of the fiber, giving the fiber its organized, contractile structure. This arrangement lets the muscle shorten as the sarcomeres contract, with the actin and myosin filaments sliding past one another. In contrast, a tendon is connective tissue that attaches muscle to bone, and a fascicle is a bundle of muscle fibers. So the description provided points to a myofibril.

**7. What percentage of ATP used by muscle activity comes from aerobic respiration?**

- A. 50%**
- B. 75%**
- C. 95%**
- D. 100%**

Energy for muscle contraction comes from multiple systems that kick in at different times. Right at the start, the immediate phosphagen system (phosphocreatine) supplies ATP for a few seconds, and anaerobic glycolysis provides additional ATP during short, intense efforts. But as activity continues and oxygen delivery meets demand, mitochondria switch to oxidative phosphorylation, using glucose and fatty acids to make ATP with high efficiency. In sustained, steady muscle activity, the vast majority of ATP—about 95%—is produced aerobically, with a small remainder coming from anaerobic pathways to cover brief bursts or the ramp-up phase. So, roughly 95% from aerobic respiration best fits how energy is supplied during longer exercise. The other percentages would imply a greater, or complete, reliance on aerobic sources than actually occurs, given the involvement of quick, anaerobic systems early on.

**8. What is described as cross-bridge formation in the cycle?**

- A. High-energy myosin head attaches to actin of the thin filament**
- B. Myosin head pivots and pulls the thin filament**
- C. ATP binds to the myosin head causing detachment**
- D. Tropomyosin moves to block actin binding sites**

Cross-bridge formation is the moment the energized myosin head attaches to an actin site on the thin filament, creating a link between the thick and thin filaments. This attachment happens after the myosin head is energized by ATP hydrolysis and the actin binding sites are exposed, allowing the myosin to grab onto actin. This bridge is what enables the myosin to perform the power stroke, pulling the actin filament toward the center of the sarcomere. Detachment occurs later when a new ATP binds to myosin, resetting the cycle. Tropomyosin movement to expose binding sites is the regulatory step that sets the stage for this attachment, but the actual cross-bridge is the myosin-actin link.

**9. What forms the cross-bridge by binding to actin during contraction?**

- A. Myosin**
- B. Actin**
- C. Tropomyosin**
- D. Troponin**

Cross-bridge formation is driven by myosin heads attaching to actin filaments. When muscles contract, the myosin head binds to specific sites on actin, creating a cross-bridge. This connection allows the myosin head to pivot (power stroke), pulling the actin filament toward the center of the sarcomere and shortening the muscle. Actin provides the binding sites for this interaction, but it does not itself form the cross-bridge; that role belongs to the myosin motor head. Tropomyosin and troponin regulate whether the binding sites on actin are exposed: calcium binds troponin, causing tropomyosin to move away from the binding sites, enabling myosin to attach. Thus, the cross-bridge is a myosin-actin interaction powered by ATP, with regulatory proteins controlling access to the binding sites.

**10. Ions move across a membrane down an electrical gradient toward an opposite charge and/or down a chemical gradient to an area of lower solute concentration. This movement is described as the**

- A. Electrochemical gradient**
- B. Diffusion**
- C. Osmosis**
- D. Active transport**

The electrochemical gradient describes the combined chemical and electrical forces that drive ion movement across a membrane. Ions move down a chemical gradient (from higher to lower concentration) and can also move toward an opposite electrical charge due to the membrane potential, yielding a net driving force called the electrochemical gradient. This concept is broader than simple diffusion, which only considers concentration differences; it also accounts for the electrical aspect that attracts or repels charged ions. Osmosis involves only water movement, not ions, and active transport requires energy to move ions against their gradient.

## Next Steps

**Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.**

**As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.**

**If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at [hello@examzify.com](mailto:hello@examzify.com).**

**Or visit your dedicated course page for more study tools and resources:**

**<https://ivytechaphy101musclesys.examzify.com>**

**We wish you the very best on your exam journey. You've got this!**

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