AQA A-Level PE Energy Systems Practice Exam (Sample)

Study Guide

BY EXAMZIFY

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

1. Indirect calorimetry estimates energy expenditure by measuring which data?

A. Only oxygen consumption

B. Only carbon dioxide production

C. Oxygen uptake and carbon dioxide production

D. Nitrogen balance

2. Which statement best describes the potential benefits and drawbacks of altitude training for endurance athletes?

A. Altitude training always improves performance with no drawbacks.

B. Altitude training has no effect on endurance performance.

C. Altitude training only benefits sprinters.

D. It can increase red blood cell count and oxygen transport but may cause acclimatization issues and reduced training intensity.

3. Which of the following would NOT contribute to a higher VO2 max?

A. Increased maximum cardiac output

B. Increased a-vO2 difference

C. Increased blood volume and haemoglobin

D. Reduced blood volume

4. Define EPOC and identify the function of the fast component of EPOC as described.

A. Excess post-exercise oxygen consumption; restores ATP and PC and re-saturates myoglobin with oxygen

B. Enhanced performance oxygen count; fast component increases VO2 during exercise

C. Endurance post-exercise oxygen check; fast component decreases oxygen debt

D. Effective post-exercise oxygen calculation; fast component oxygenates blood lactate

5. How is lactic acid removed in the slow component / replenishment stage?

A. Transported in the blood to the liver where it is converted to glucose via the Cori cycle.

B. Removed in sweat and urine.

C. Oxidation into carbon dioxide and water in the inactive muscles and organs, used by the muscles as energy.

D. Converted into urea.

6. Sarcoplasm is described as

A. Cytoplasm

B. Interstitial fluid

C. Sarcoplasm

D. Nucleoplasm

7. Altitude training is usually carried out at approximately what elevation where the partial pressure of oxygen is lower?

A. 1500m

B. 1000m

C. 2500m+

D. 4000m+

8. Which statements describe the Krebs cycle as presented?

A. Pyruvic acid combines with acetyl CoA to form citric acid

B. Hydrogen is removed from citric acid

C. Carbon dioxide is produced

D. All of the above

9. Explain the main cause of muscle fatigue during this race.

A. Lactate accumulation and increased acidity

B. Dehydration

C. Inhibition of enzyme action

D. Lack of oxygen

10. Which energy system is preferentially used when exercise intensity is low and oxygen supply is high?

A. Glycolytic

B. Creatine phosphate system

C. Aerobic

D. Lactate shuttle

Answers

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

Explanations

1. Indirect calorimetry estimates energy expenditure by measuring which data?

A. Only oxygen consumption

B. Only carbon dioxide production

C. Oxygen uptake and carbon dioxide production

D. Nitrogen balance

Indirect calorimetry estimates energy expenditure by tracking how the body uses oxygen and produces carbon dioxide during metabolism. When nutrients are oxidized, oxygen is consumed and carbon dioxide is generated, so the rates of oxygen uptake (VO_2) and carbon dioxide production (VCO_2) together reflect how much energy is being produced. Measuring both allows you to apply established equations that convert gas exchange into energy expenditure, and the ratio of CO_2 produced to O_2 consumed (the respiratory exchange ratio) provides insight into which fuels are being burned. If you only measure one gas, you'd miss important information about substrate use and would struggle to estimate energy expenditure accurately. Nitrogen balance relates to protein metabolism and isn't used for the overall energy estimate in standard indirect calorimetry.

2. Which statement best describes the potential benefits and drawbacks of altitude training for endurance athletes?

A. Altitude training always improves performance with no drawbacks.

B. Altitude training has no effect on endurance performance.

C. Altitude training only benefits sprinters.

D. It can increase red blood cell count and oxygen transport but may cause acclimatization issues and reduced training intensity.

Altitude training uses a low-oxygen environment to trigger adaptations that can help endurance performance. When athletes train in these conditions, the body often increases production of red blood cells, boosting the oxygen-carrying capacity of the blood and making oxygen delivery to working muscles more efficient. This can translate into better endurance performance after returning to normal oxygen levels, because the muscles receive more oxygen during aerobic work. But there are drawbacks to balance this with the benefits. Adapting to altitude can cause acclimatization issues such as headaches, sleep disturbance, fatigue, and overall reduced well-being. Because the air is thinner, sustaining training at the same intensity as at sea level is harder, so training quality and volume are often reduced. If the training stimulus is too limited for too long, adaptations can be blunted or lost. So the overall picture is that altitude exposure can enhance oxygen transport and endurance potential, but only if the training is carefully planned to manage acclimatization and maintain enough training load. The statement that altitude training always improves performance with no drawbacks is too simplistic, and the idea that it has no effect isn't accurate. It's primarily used for endurance athletes rather than sprinters, and the benefits depend on how well the program manages the altitude-related challenges.

3. Which of the following would NOT contribute to a higher VO2 max?

A. Increased maximum cardiac output

B. Increased a-vO2 difference

C. Increased blood volume and haemoglobin

D. Reduced blood volume

VO2 max depends on delivering oxygen to the working muscles and the muscles' ability to use it. Two main players are how much blood the heart can pump (cardiac output) and how much oxygen is extracted from the blood by the muscles (arteriovenous O2 difference). Increasing maximum cardiac output raises VO2 max because more blood—and thus more oxygen—can reach the muscles each minute. Increasing the arteriovenous O2 difference raises VO2 max because muscles extract more oxygen from the same amount of blood, improving utilization. Increasing blood volume and haemoglobin boosts the blood's oxygen-carrying capacity and supports greater oxygen transport, which also raises VO2 max. Reducing blood volume, however, lowers venous return to the heart, decreases stroke volume and thus cardiac output, and limits the amount of oxygen that can be delivered to the muscles. Therefore it would not contribute to a higher VO2 max.

4. Define EPOC and identify the function of the fast component of EPOC as described.

A. Excess post-exercise oxygen consumption; restores ATP and PC and re-saturates myoglobin with oxygen

B. Enhanced performance oxygen count; fast component increases VO2 during exercise

C. Endurance post-exercise oxygen check; fast component decreases oxygen debt

D. Effective post-exercise oxygen calculation; fast component oxygenates blood lactate

EPOC is the elevated rate of oxygen uptake after exercise as the body returns to its resting state and repays the oxygen debt built up during activity. The fast component of EPOC is the immediate portion of this recovery, driving quick restorations that happen in the minutes right after stopping exercise. Its main job is to replenish ATP and phosphocreatine stores in muscles and to re-saturate myoglobin with oxygen, which helps ready the muscle for future activity and supports rapid recovery of the energy systems. This component occurs quickly and tapers off, while other recovery processes (like lactate clearance and normalization of body temperature) contribute to the slower, longer-lasting part of EPOC. The described function aligns with the fast component because it focuses on restoring energy-phosphate stores and oxygen-binding capacity in muscles, rather than during exercise or lactate processing.

5. How is lactic acid removed in the slow component / replenishment stage?

A. Transported in the blood to the liver where it is converted to glucose via the Cori cycle.

B. Removed in sweat and urine.

C. Oxidation into carbon dioxide and water in the inactive muscles and organs, used by the muscles as energy.

D. Converted into urea.

During the slow component of recovery, the body uses the available oxygen to clear lactate by oxidizing it, turning lactate into carbon dioxide and water inside tissues. This oxidation also provides energy, helping to replenish energy stores and restore muscle function. While some lactate can be converted back to glucose in the liver via the Cori cycle, the primary route in this recovery phase is its oxidation in muscles and other tissues. Lactate isn't primarily removed by sweating or urine, and it isn't converted to urea.

6. Sarcoplasm is described as

A. Cytoplasm

B. Interstitial fluid

C. Sarcoplasm

D. Nucleoplasm

Sarcoplasm is the muscle cell's own version of cytoplasm. It refers to the fluid inside a muscle fiber, bounded by the cell membrane, where the cytosol and organelles like mitochondria and glycogen stores reside. In muscle tissue this specialized cytoplasm is called sarcoplasm, so describing it as the cytoplasm of a muscle cell is the precise way to express what it is. It's separate from interstitial fluid, which sits between cells in tissue, and from nucleoplasm, which is the substance inside the cell nucleus.

7. Altitude training is usually carried out at approximately what elevation where the partial pressure of oxygen is lower?

A. 1500m

B. 1000m

C. 2500m+

D. 4000m+

Altitude training relies on creating a hypoxic environment, where the partial pressure of oxygen is lower due to reduced barometric pressure as elevation increases. This low PO2 stimulates adaptations such as increased red blood cell production and enhanced oxygen transport and utilization. The typical training altitude is about 2,500 meters or higher, which provides a meaningful hypoxic challenge without becoming impractical for most athletes. At around 1,000–1,500 meters the reduction in PO2 is less pronounced, offering a weaker stimulus, while very high elevations (around 4,000 meters and above) impose greater stress and are not as commonly used for standard programs. Thus, the usual altitude training elevation is roughly 2,500 meters and above.

8. Which statements describe the Krebs cycle as presented?

A. Pyruvic acid combines with acetyl CoA to form citric acid

B. Hydrogen is removed from citric acid

C. Carbon dioxide is produced

D. All of the above

In the Krebs cycle, the acetyl group from acetyl-CoA is oxidized to CO_2 in the mitochondrial matrix, while energy carriers NADH and $FADH_2$ are produced to drive the electron transport chain. The cycle begins with acetyl-CoA combining with oxaloacetate to form citrate, and the acetyl group ultimately comes from pyruvate after it is converted to acetyl-CoA—so describing citrate formation reflects what happens when entering the cycle. Hydrogen is removed from intermediates as they are oxidized, transferring to NAD^+ and FAD to make NADH and $FADH_2$, and carbon dioxide is released during decarboxylation steps. Since all these events occur in the Krebs cycle, the combined description is correct.

9. Explain the main cause of muscle fatigue during this race.

A. Lactate accumulation and increased acidity

B. Dehydration

C. Inhibition of enzyme action

D. Lack of oxygen

When a race is intense, the muscles push energy production beyond what oxygen alone can supply, so they rely on anaerobic glycolysis. This process converts glucose to lactate, regenerating NAD^+ so glycolysis can continue, but it also releases hydrogen ions. The buildup of these H^+ ions lowers the muscle's pH, creating an acidic environment that interferes with the proteins involved in contraction and slows enzyme reactions needed for energy release. This combination directly reduces force and accelerates fatigue, making lactate accumulation and increased acidity the most immediate cause of fatigue in this scenario. Dehydration, lack of oxygen, or enzyme inhibition can contribute, but they're not the primary mechanism driving fatigue here; the acid buildup from lactate production is what most strongly limits performance.

10. Which energy system is preferentially used when exercise intensity is low and oxygen supply is high?

A. Glycolytic

B. Creatine phosphate system

C. Aerobic

D. Lactate shuttle

When exercise is easy and oxygen is plentiful, energy is produced mainly through aerobic metabolism. Oxidative phosphorylation in mitochondria uses substrates like carbohydrates and fats to generate ATP efficiently, giving a large energy yield that can sustain activity for longer periods. The creatine phosphate system provides energy only for a very short, rapid burst, so it isn't the main source here. Anaerobic glycolysis would dominate if oxygen were limited or intensity higher, because it can produce ATP quickly without relying on oxygen, but it's less efficient and leads to lactate buildup. The lactate shuttle describes how lactate can be used as fuel, but it isn't the primary energy source at low intensity with high oxygen.

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.

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

https://aqaalevelpeenergysystems.examzify.com

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