

SQA HIGHER PHYSICS PRACTICE EXAM (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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THE FULL VERSION STUDY GUIDE

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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. What is referred to when two waves meet out of phase producing a minimum intensity?**
 - A. Constructive interference
 - B. Destructive interference
 - C. Resonance
 - D. Destructive summation
- 2. What occurs to the energy levels in semiconductors when temperature increases?**
 - A. Energy levels decrease
 - B. Charge carrier concentration decreases
 - C. Conductivity increases
 - D. No change occurs
- 3. According to the law of conservation of energy, what happens to energy in a closed system?**
 - A. It is created and destroyed
 - B. It is transformed from one form to another
 - C. It is maintained constant
 - D. It dissipates into the environment
- 4. What is the name of the phenomenon where electrons are emitted from a material when illuminated by light?**
 - A. Photoelectric effect
 - B. Electron emission
 - C. Photon absorption
 - D. Light emission
- 5. What is the photoelectric effect?**
 - A. Emission of electrons when illuminated by light of certain frequencies
 - B. Absorption of light by electrons in a material
 - C. Reflection of light off the surface of a material
 - D. Deflection of light by a magnetic field

6. What is electric potential difference?

- A. Electric potential difference is the energy gained by a charge moving against a magnetic field.
- B. Electric potential difference, or voltage, is the work done per unit charge in an electric field.
- C. Electric potential difference measures the static charge of an object.
- D. Electric potential difference refers to the current flowing through a conductor.

7. What defines specific heat capacity?

- A. The energy required to change the state of a substance
- B. The amount of heat needed to raise 1 kg of a substance by 1 °C
- C. The energy per unit temperature change of a material
- D. The heat loss during a phase change

8. According to Boyle's Law, what is the relationship between pressure and volume of a gas?

- A. Pressure is directly proportional to volume
- B. Pressure is inversely proportional to volume at constant temperature
- C. Pressure remains constant as volume changes
- D. Volume increases with decreased pressure

9. What is the primary role of a transformer?

- A. A transformer is used to amplify sound signals.
- B. A transformer increases or decreases the voltage of alternating current (AC).
- C. A transformer converts mechanical energy to electrical energy.
- D. A transformer generates direct current (DC) from AC sources.

10. A particle that is classified as matter is known as?

- A. Boson
- B. Fermion
- C. Quark
- D. Meson

Answers

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

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Explanations

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1. What is referred to when two waves meet out of phase producing a minimum intensity?

- A. Constructive interference
- B. Destructive interference**
- C. Resonance
- D. Destructive summation

When two waves meet out of phase, their crests align with troughs of the other wave. This relationship results in cancellation of the wave amplitudes, which effectively reduces the overall intensity of the resultant wave. This phenomenon is known as destructive interference. In this scenario, the maximum positive displacement of one wave coincides with the maximum negative displacement of another, leading to a net displacement closer to zero. This is why the intensity—the power per unit area—is minimized. Destructive interference is a key concept in wave physics, illustrating how waves can interact in ways that diminish their overall effects when they do not synchronize positively. Understanding this concept also helps differentiate it from constructive interference, where waves are in phase and amplify one another, resulting in greater intensity. The other terms, resonance and destructive summation, are not standard terminology used to describe this specific interaction of waves and would not be appropriate in this context.

2. What occurs to the energy levels in semiconductors when temperature increases?

- A. Energy levels decrease
- B. Charge carrier concentration decreases
- C. Conductivity increases**
- D. No change occurs

In semiconductors, when the temperature increases, the energy levels of the charge carriers are influenced by thermal excitation. As temperature rises, more electrons gain sufficient energy to jump from the valence band into the conduction band. This increases the number of charge carriers available for conduction, which in turn leads to an increase in conductivity. The increased thermal energy enhances the mobility of these charge carriers, allowing them to move more freely through the semiconductor material. Consequently, the overall conductivity of the semiconductor material rises with temperature, facilitating more efficient electrical conduction. This behavior is fundamental to the function of semiconductors and is utilized in various applications, such as in thermistors and temperature sensors, where the variation in conductivity with temperature is a key principle.

3. According to the law of conservation of energy, what happens to energy in a closed system?

- A. It is created and destroyed
- B. It is transformed from one form to another**
- C. It is maintained constant
- D. It dissipates into the environment

In a closed system, the law of conservation of energy asserts that energy cannot be created or destroyed; rather, it can only change forms. This means that energy present in different states—such as kinetic energy, potential energy, thermal energy, and others—can be interconverted as processes take place within the system, but the total amount of energy remains constant. For example, potential energy can convert to kinetic energy when an object falls, and heat energy can result from friction, but the overall energy in the system does not fluctuate. The correct response highlights this transformation aspect, emphasizing that while energy changes its form, the total energy within the closed system remains unchanged, in alignment with the conservation principle. This is crucial in understanding various physical processes, such as mechanical systems or thermodynamic cycles. Other responses would suggest misconceptions about energy dynamics; for instance, the idea of energy being created or destroyed (first choice) contradicts the fundamental principle of conservation. Mentioning the energy dissipating into the environment implies an open system where energy can leave, which does not apply to closed systems. Hence, choice B accurately reflects the reality of energy behavior in closed systems.

4. What is the name of the phenomenon where electrons are emitted from a material when illuminated by light?

- A. Photoelectric effect**
- B. Electron emission
- C. Photon absorption
- D. Light emission

The phenomenon where electrons are emitted from a material when illuminated by light is known as the photoelectric effect. This effect demonstrates the interaction between light and matter, specifically how light can impart energy to electrons, thereby enabling them to overcome the attractive forces binding them to the material. When light of a sufficient frequency strikes the material, photons are absorbed, transferring their energy to the electrons. If this energy exceeds the work function (the minimum energy required to release an electron from the material), electrons are ejected. This phenomenon was crucial in establishing the particle theory of light and supports the idea that light can behave as both a wave and a particle. The photoelectric effect has numerous practical applications, including in photovoltaic cells and photo detectors, highlighting its significance in both theoretical and applied physics. Other choices, while they may refer to related concepts, do not specifically denote this unique relationship between light and electron emission.

5. What is the photoelectric effect?

- A. Emission of electrons when illuminated by light of certain frequencies
- B. Absorption of light by electrons in a material
- C. Reflection of light off the surface of a material
- D. Deflection of light by a magnetic field

The photoelectric effect refers to the phenomenon where electrons are emitted from a material when it is illuminated by light of specific frequencies. This effect is a crucial concept in quantum physics and demonstrates the particle nature of light. When photons, which are particles of light, collide with the electrons in a material, they can transfer sufficient energy to these electrons to overcome the attractive forces holding them in the material. If the energy of the incident light (photon energy) is greater than the work function (the minimum energy required to free an electron from the material), then electrons can be emitted. This means that the frequency of the light must be above a certain threshold for the photoelectric effect to occur. Further, the number of emitted electrons is directly related to the intensity of the light, while the energy of the emitted electrons depends on the frequency of the incoming light. The other options describe unrelated phenomena. Absorption of light refers to the process by which photons are taken up by electrons but does not specifically lead to the emission of electrons. Reflection involves light bouncing off a surface without transferring energy to electrons in a way that results in emission. Deflection of light by a magnetic field pertains to the behavior of charged particles in magnetic fields, which is unrelated to the emission.

6. What is electric potential difference?

- A. Electric potential difference is the energy gained by a charge moving against a magnetic field.
- B. Electric potential difference, or voltage, is the work done per unit charge in an electric field.
- C. Electric potential difference measures the static charge of an object.
- D. Electric potential difference refers to the current flowing through a conductor.

Electric potential difference, often referred to as voltage, is defined as the work done per unit charge in an electric field. This means that when a charge moves through an electric field, it can gain or lose energy depending on the direction of movement relative to the field. The potential difference quantifies how much energy is transferred for each coulomb of charge moved, allowing for a clear understanding of how electric forces perform work. This concept is fundamental in understanding how electric circuits function, where different components can provide or use energy as charge carriers (electrons, for example) move from one point to another. Voltage is what motivates the flow of current in conductive materials, representing the driving force behind electrical energy transfer. The other options describe concepts that do not accurately reflect the definition of electric potential difference. The first option incorrectly attributes the notion of moving against a magnetic field rather than focusing on electric fields. The third option mentions static charge, which relates more to electrostatics rather than potential difference in a dynamic system. The fourth option misrepresents potential difference by discussing current flow, which is a consequence of potential difference but not the definition itself.

7. What defines specific heat capacity?

- A. The energy required to change the state of a substance
- B. The amount of heat needed to raise 1 kg of a substance by 1 °C**
- C. The energy per unit temperature change of a material
- D. The heat loss during a phase change

Specific heat capacity is defined as the amount of heat required to raise the temperature of 1 kilogram of a substance by 1 °C (or 1 K). This definition reflects how much energy is needed to change the temperature of a given mass of a material, which varies based on the material's properties. Each substance has a specific heat capacity that indicates how much energy must be supplied or removed to affect its temperature, making it a crucial concept in thermodynamics and heat transfer. In contrast to other options, the energy required to change the state of a substance involves phase changes (like melting or boiling) rather than temperature changes, thus referring to latent heat rather than specific heat capacity. The energy per unit temperature change of a material could be partially related but lacks the specificity of the mass (1 kg) and the temperature change (1 °C). Lastly, heat loss during a phase change pertains to energy transitions that do not involve temperature changes, again unrelated to the specific heat capacity's definition. Therefore, the correct choice clearly aligns with the precise definition of specific heat capacity.

8. According to Boyle's Law, what is the relationship between pressure and volume of a gas?

- A. Pressure is directly proportional to volume
- B. Pressure is inversely proportional to volume at constant temperature**
- C. Pressure remains constant as volume changes
- D. Volume increases with decreased pressure

Boyle's Law states that for a given quantity of gas at constant temperature, the product of the pressure and volume of the gas remains constant. This can be mathematically expressed as $P \times V = \text{constant}$. From this relationship, it follows that if the volume of a gas increases, the pressure decreases, and vice versa, provided the temperature remains unchanged. This means that pressure and volume are inversely proportional to each other. When pressure is plotted against volume, the graph shows a hyperbolic curve, indicating that as one variable increases, the other must decrease to maintain the balance of the equation. Therefore, the correct answer highlights that Boyle's Law establishes the inverse relationship between pressure and volume under conditions of constant temperature, accurately reflecting the nature of gas behavior in thermodynamics.

9. What is the primary role of a transformer?

- A. A transformer is used to amplify sound signals.
- B. A transformer increases or decreases the voltage of alternating current (AC).**
- C. A transformer converts mechanical energy to electrical energy.
- D. A transformer generates direct current (DC) from AC sources.

The primary role of a transformer is to increase or decrease the voltage of alternating current (AC). Transformers operate based on the principle of electromagnetic induction, which allows them to change the voltage level while transferring electrical energy from one circuit to another. When current flows through the primary coil of a transformer, it creates a magnetic field that induces a voltage in the secondary coil. By adjusting the number of turns of wire in each coil (the primary and secondary), a transformer can step up (increase) or step down (decrease) the voltage. This capability is crucial for efficiently transmitting electrical power over long distances, as it minimizes energy losses associated with high currents. The other options don't align with the function of a transformer. Amplifying sound signals pertains to audio electronics and not to voltage transformation. The conversion of mechanical energy to electrical energy is typically performed by generators, not transformers. Additionally, generating direct current from alternating current is the function of rectifiers, not transformers, which specifically work with AC. Thus, the role of a transformer is distinctly associated with voltage modification within AC systems.

10. A particle that is classified as matter is known as?

- A. Boson
- B. Fermion**
- C. Quark
- D. Meson

A particle that is classified as matter is a fermion. Fermions are fundamental particles that comply with the Pauli exclusion principle, which states that no two identical fermions can occupy the same quantum state simultaneously. This characteristic is crucial for the structure of matter, as it gives rise to the diverse properties of atoms and the formation of the physical world as we know it. Common examples of fermions include electrons, protons, and neutrons, all of which are essential building blocks of atoms. Fermions have half-integer spins (e.g., $1/2$, $3/2$), which is a defining trait that distinguishes them from bosons, which are force-carrying particles with integer spins. While other choices such as bosons, quarks, and mesons also relate to the study of particles, they do not specifically identify particles classified as matter in the same fundamental way that fermions do. Bosons, for instance, are force carriers and include particles like photons and gluons, while quarks are the constituents of hadrons and contribute to the makeup of protons and neutrons. Mesons are composed of a quark and an antiquark, and while they are part of matter in terms of the strong interaction

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:

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

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