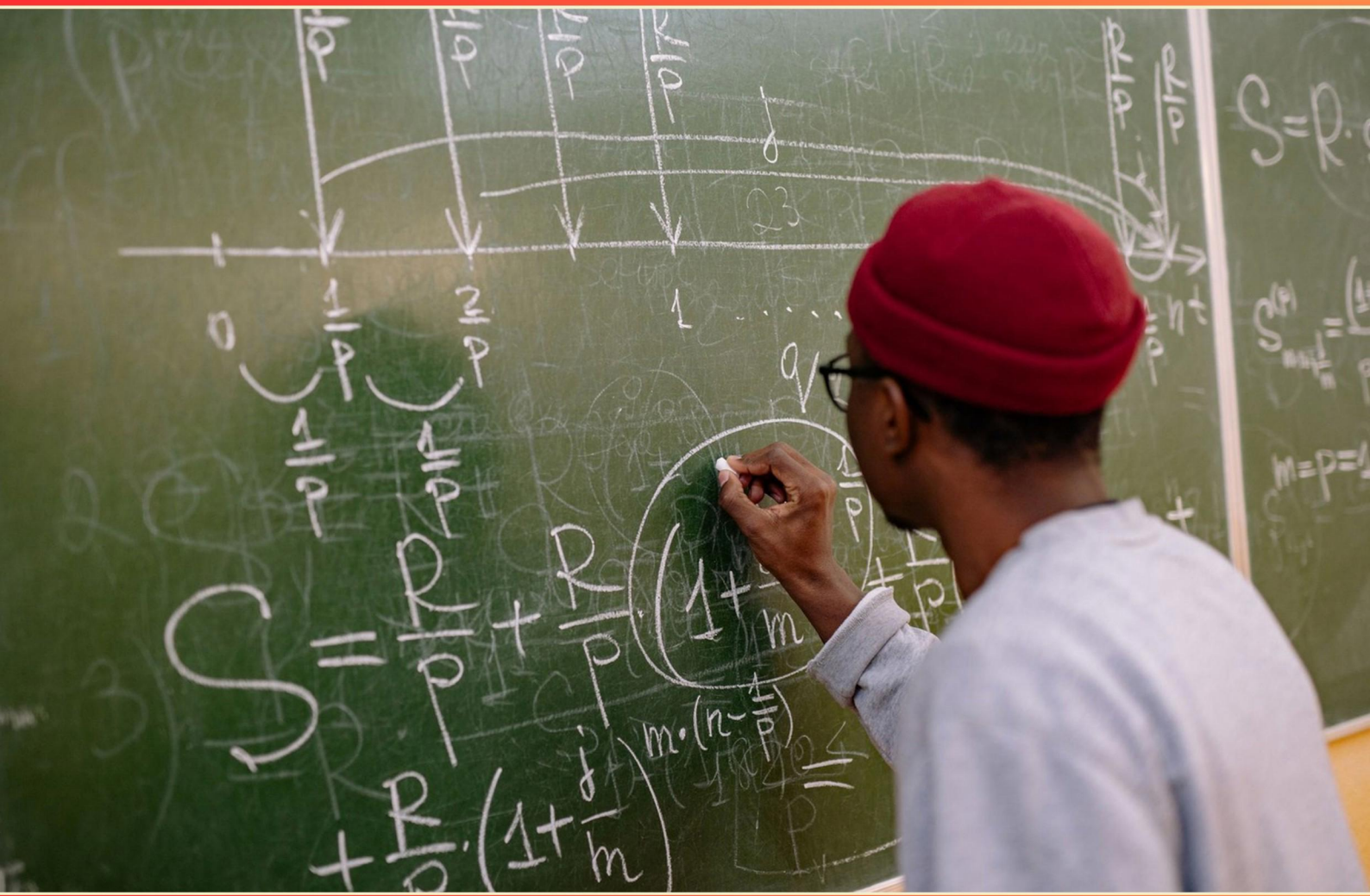
QCAA PHYSICS PRACTICE TEST (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Table of Contents

Copyright 1

Table of Contents 2

Introduction 3

How to Use This Guide 4

Questions 5

Answers 8

Explanations 10

Next Steps 15

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. **In relativity, what symbol is commonly used for time?**

   A. t

   B. T

   C. s

   D. tau

2. **Which law states that a changing magnetic flux through a circuit induces an EMF proportional to the rate of change of the flux linkage?**

   A. Ampere's law

   B. Biot-Savart law

   C. Faraday's law

   D. Ohm's law

3. **What is the distance between corresponding points on successive waves called? (symbol λ, SI unit metre)**

   A. Amplitude

   B. Period

   C. Wavelength

   D. Frequency

4. **Which unit of energy is defined as the work done on an electron when it is accelerated by a potential difference of 1 volt?**

   A. Joule

   B. Watt

   C. Electron volt (eV)

   D. Ampere

5. **What symbol denotes proper length?**

   A. L

   B. l0

   C. L0

   D. Lprime

6. Which model posits electrons move in stationary states with fixed angular momentum and energy, with radius related to energy?

A. Bohr model

B. Rutherford's model

C. Quantum mechanical model

D. Electron cloud model

7. Which statement expresses the relativity of simultaneity?

A. Events simultaneous in one frame are also simultaneous in all frames.

B. The speed of light is the same in all frames.

C. Time intervals between events are identical in all frames.

D. Events that are simultaneous in one frame may not be simultaneous in another inertial frame.

8. Which force acts perpendicular to a contact surface, preventing penetration?

A. Friction

B. Gravity

C. Drag

D. Normal force

9. An almost massless and neutral elementary particle produced in radioactive decay of pions.

A. Photon

B. Electron neutrino

C. Muon neutrino

D. Proton

10. Time dilation refers to which phenomenon?

A. The time interval between two events is shorter for a moving observer than for a stationary observer.

B. The contraction of lengths in the direction of motion.

C. The slowing of moving clocks relative to stationary clocks.

D. The speed of light varies with velocity.

Answers

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

Explanations

1. In relativity, what symbol is commonly used for time?

A. t

B. T

C. s

D. tau

Time in relativity is most often represented by a lowercase t. This mirrors how we label spatial coordinates with x, y, and z, treating time as the fourth parameter that tells us when events occur along an observer's frame. The symbol τ (tau) is commonly used for proper time, which is the time a clock would measure along an object's worldline. Uppercase T isn't the standard symbol for the time coordinate in relativity, though it might appear in some problems or contexts for other quantities. So, the usual symbol for time is t.

2. Which law states that a changing magnetic flux through a circuit induces an EMF proportional to the rate of change of the flux linkage?

A. Ampere's law

B. Biot-Savart law

C. Faraday's law

D. Ohm's law

Faraday's law of electromagnetic induction says an electromotive force is induced in a circuit whenever the magnetic flux through that circuit changes. The induced EMF is proportional to the rate of change of the flux linkage, which for a coil with N turns is EMF = - dλ/dt, where λ = NΦ. So if the flux linkage changes quickly, a larger EMF is produced, and if the flux is steady, no EMF appears. The negative sign (Lenz's law) means the induced EMF acts to oppose the change in flux. This directly contrasts with the other laws listed: Ampere's law relates magnetic fields to currents, Biot-Savart law describes the magnetic field from current elements, and Ohm's law relates voltage, current, and resistance in a conductor. None of these state that a changing magnetic flux induces an EMF in the way Faraday's law does.

3. What is the distance between corresponding points on successive waves called? (symbol λ, SI unit metre)

A. Amplitude

B. Period

C. Wavelength

D. Frequency

The main idea here is the spatial repeating distance of a wave. The distance between two successive identical points on adjacent cycles—such as one crest to the next crest or one trough to the next trough—is the wavelength. It tells you how long a full wave pattern is along the direction the wave travels, and it is denoted by the Greek letter lambda (λ) with units of metres. Amplitude describes how tall the wave is, not how long one cycle spans. Period is the time it takes for one complete cycle to pass a point, and frequency is how many cycles occur per second. If you know the wave's speed and its frequency, you can find the wavelength using λ = v / f.

4. Which unit of energy is defined as the work done on an electron when it is accelerated by a potential difference of 1 volt?

A. Joule

B. Watt

C. Electron volt (eV)

D. Ampere

When a charged particle moves through an electric potential difference, the energy it gains is the product of its charge and the potential difference: E = qV. For an electron, q is the elementary charge. The electron volt is defined as the amount of work needed to move one elementary charge across a potential difference of one volt. Therefore, accelerating an electron by 1 volt gives it 1 eV of energy, which equals about 1.6 × 10^-19 joules. The joule is a general unit of energy, but the electron volt is the convenient unit for this small-scale energy. The other options correspond to different quantities: watt is power, and ampere is electric current, not energy.

5. What symbol denotes proper length?

A. L

B. l0

C. L0

D. Lprime

Proper length is the length of an object measured in its own rest frame, where the object is at rest. The standard symbol for this rest (or proper) length is L with a subscript zero, written as L0. The subscript zero signals that the measurement is taken in the object's rest frame; in another frame where the object is moving, the length you measure is shorter due to length contraction, often denoted simply by L in that frame. The prime symbol or other forms aren't the conventional way to denote proper length, so L0 is the correct symbol.

6. Which model posits electrons move in stationary states with fixed angular momentum and energy, with radius related to energy?

A. Bohr model

B. Rutherford's model

C. Quantum mechanical model

D. Electron cloud model

The main idea here is that atomic orbits come in discrete, non-changing states where certain quantities are fixed, and the size of the orbit is tied to the energy of that state. The Bohr model embodies this: electrons move in circular orbits with angular momentum restricted to integer multiples of Planck's constant divided by 2π, so L = nℏ. The energy of each level is quantized, and for hydrogen-like atoms E_n -1/n^2, which means the energy determines how tightly bound the electron is. Because the energy level also sets the orbit size, the radius grows with the energy level (r_n n^2). In a stationary state, the electron does not radiate, so its energy and radius stay constant until a transition occurs, at which point a photon is emitted or absorbed with energy equal to the difference between levels. This explicit link between fixed angular momentum, fixed energy, and a radius that depends on energy is what the Bohr model uniquely provides. Other models describe continuous or probabilistic distributions of electron position and do not pair quantized angular momentum with a radius tied to energy in the same way.

7. Which statement expresses the relativity of simultaneity?

A. Events simultaneous in one frame are also simultaneous in all frames.

B. The speed of light is the same in all frames.

C. Time intervals between events are identical in all frames.

D. Events that are simultaneous in one frame may not be simultaneous in another inertial frame.

Relativity of simultaneity means that whether two events happen at the same time depends on the observer's frame of reference. Because light has a finite speed and time and space mix when you change frames, two events that are simultaneous in one inertial frame can occur at different times in another moving frame. A handy way to picture this is to consider two events that occur at the same moment but at different locations in one frame; for a observer moving relative to that frame, the light signals from those events reach them at different times, so they assign different time coordinates to when those events happened. In more formal terms, the Lorentz transformation shows that equal times in one frame translate into unequal times in a moving frame when the events are at different positions, so they are not simultaneous there. This is why the statement about simultaneity being the same in all frames isn't correct. The speed of light being the same in all frames is a separate postulate about how light behaves, not about whether events are simultaneous. And time intervals between events aren't identical in all frames either; moving clocks run slow, a phenomenon known as time dilation. The key takeaway is that simultaneity is relative, not absolute.

8. Which force acts perpendicular to a contact surface, preventing penetration?

A. Friction

B. Gravity

C. Drag

D. Normal force

Normal force is the contact force that acts perpendicular to the surface in contact. It arises whenever two objects touch and its job is to prevent them from occupying the same space, pushing the objects apart along the direction normal to the surface. The direction is always away from the surface, and its magnitude adjusts so there's no penetration, such as a block resting on a table where the normal force balances the perpendicular component of weight. Friction, by contrast, acts along the surface and resists sliding. Gravity generally pulls downward toward Earth and isn't constrained to be perpendicular to the surface, though on an incline its perpendicular component is balanced by the normal force. Drag acts opposite to the motion through a fluid. The defining feature here is the perpendicular orientation to the surface to prevent interpenetration.

9. An almost massless and neutral elementary particle produced in radioactive decay of pions.

A. Photon

B. Electron neutrino

C. Muon neutrino

D. Proton

Pions decay through the weak interaction, and the charged pions most commonly decay into a muon and a muon neutrino. The muon neutrino is an elementary particle that is electrically neutral and has an extremely small rest mass, so it behaves as almost massless in many contexts. This makes it the natural example of the type of particle described: neutral and nearly massless, produced in pion decay. The electron-neutrino channel exists but is much rarer due to helicity suppression, so it is not the characteristic product. A photon would come from the neutral pion's decay into two photons, not from the typical charged-pion decay. A proton is not produced in these decays. Hence the muon neutrino best fits the description.

10. Time dilation refers to which phenomenon?

A. The time interval between two events is shorter for a moving observer than for a stationary observer.

B. The contraction of lengths in the direction of motion.

C. The slowing of moving clocks relative to stationary clocks.

D. The speed of light varies with velocity.

Time dilation is about how motion affects the rate at which time passes for different observers. A clock that is moving relative to you ticks more slowly than a clock that is at rest with you. In other words, the time interval between ticks, as measured in your frame, is longer than the proper time interval between those same ticks on the moving clock. This slowdown is described by the factor gamma = 1 / sqrt(1 − v^2/c^2), so the faster the motion, the more pronounced the effect. That's why a moving clock appears to run slow. This idea is not about lengths. Length contraction is a related but separate effect, describing how objects appear shorter in the direction of motion. It's also not about the speed of light changing—one of the postulates of relativity is that light's speed is the same in all inertial frames.

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://qcaaphysics.examzify.com

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