gcse physics june 2013 ph2hp mark scheme Updated Version

gcse physics june 2013 ph2hp mark scheme is a vital resource for students, teachers, and examiners aiming to understand the standards and expectations of the GCSE Physics paper from June 2013. This detailed mark scheme provides insights into how examiners allocate marks for various questions, the key points students needed to include in their answers, and the overall structure of the grading criteria. Whether you're revising for upcoming exams or analyzing past papers to improve your performance, understanding the gcse physics june 2013 ph2hp mark scheme is essential for mastering the subject.

Overview of the GCSE Physics June 2013 Paper 2 (PH2HP) Mark Scheme

What is the Purpose of the Mark Scheme?

The gcse physics june 2013 ph2hp mark scheme serves as a guide for examiners to ensure consistency and fairness in marking student responses. It details:

- Expected key points for each question
- Mark allocation for different parts of the answer
- Model answers and acceptable alternative responses
- Guidance on awarding marks for calculations, diagrams, and explanations

For students, familiarizing themselves with the mark scheme can help identify the critical elements that should be included in their answers to maximize their scores.

Structure of the June 2013 PH2HP Paper

The PH2HP paper typically covers a range of physics topics, such as:

- Energy and energy resources
- Electric circuits and electromagnetism
- Waves and the electromagnetic spectrum
- Forces and motion
- Material properties and their applications

The mark scheme provides detailed marking points for each question, emphasizing clarity, accuracy, and completeness.

Key Components of the gcse physics june 2013 ph2hp mark scheme

Multiple-Choice and Short-Answer Questions

For straightforward questions, the mark scheme specifies:

- Single correct answers earn full marks
- Partially correct responses may earn partial marks based on the number of correct points included
- Common misconceptions or errors are noted, with guidance on how they influence marks

Students should aim to provide precise and concise answers, ensuring they address the question's core requirements.

Calculations and Numerical Questions

For calculation-based questions, the mark scheme emphasizes:

- Showing all relevant working steps
- Using correct formulas and units
- Providing the final answer with appropriate significant figures and units
- Allowing some tolerance for minor numerical errors, depending on the question

Practicing these types of questions using the mark scheme can help students develop effective problem-solving strategies.

Descriptive and Explanatory Questions

For questions requiring explanations:

- Marks are awarded for clarity, logical reasoning, and inclusion of key physics principles
- Diagrams, if requested, must be accurate and well-labelled
- Examples of acceptable explanations are provided in the mark scheme to guide students

Being thorough and precise in explanations is crucial to achieving high marks.

Common Topics Covered in the June 2013 PH2HP Mark Scheme

Energy and Energy Resources

The mark scheme expects students to:

- Define different forms of energy (kinetic, potential, thermal, etc.)
- Explain energy transfers and conservation principles
- Describe renewable and non-renewable energy sources
- Calculate energy efficiency and cost-related questions

Electric Circuits and Electromagnetism

Key points include:

- Understanding circuit components (resistors, batteries, switches)
- Applying Ohm's law (V=IR) in calculations
- Explaining the function of electromagnets and transformers
- Describing series and parallel circuits

Waves and Electromagnetic Spectrum

Students should be able to:

- Identify wave properties (wavelength, frequency, speed, amplitude)
- Describe the behavior of waves (reflection, refraction, diffraction)
- Explain the uses and dangers of electromagnetic waves (radio, microwave, X-ray)

Forces and Motion

Important concepts include:

- Calculating speed, acceleration, and force using Newton?s laws
- Understanding momentum and its conservation
- Describing friction, air resistance, and their effects

Material Properties and Applications

Students are expected to:

- Describe properties like density, elasticity, and thermal conductivity
- Explain how materials are used in engineering and construction
- Discuss the impact of material properties on their applications

Tips for Using the gcse physics june 2013 ph2hp mark scheme Effectively

For Students Preparing for Exams

- Review past papers alongside the mark scheme to understand marking patterns
- Practice explaining concepts clearly, as mark schemes value explanations
- Use the mark scheme to identify essential points for each question type
- Focus on common misconceptions noted in the mark scheme to avoid errors

For Teachers and Markers

- Use the mark scheme to maintain consistency across different examiners
- Ensure students are aware of how marks are awarded for various responses
- Update teaching materials based on insights from the mark scheme

Conclusion: Why the gcse physics june 2013 ph2hp mark scheme Matters

Understanding the gcse physics june 2013 ph2hp mark scheme is crucial for achieving success in GCSE Physics. It not only guides students on how to structure their answers effectively but also provides insight into what examiners are looking for. By studying the mark scheme in conjunction with past papers, students can identify key concepts, improve their application of physics principles, and enhance their exam technique. Whether you're revising specific topics like energy or electromagnetic waves or practicing calculations, this mark scheme is an invaluable tool for mastering GCSE Physics and achieving your academic goals.

Remember, thorough preparation, practice, and understanding the marking criteria are the keys to excelling in your exams.

GCSE Physics June 2013 PH2HP Mark Scheme: An Expert Analysis

Introduction

When preparing for GCSE Physics examinations, students and educators alike seek clear, comprehensive, and reliable mark schemes to understand how examiners award marks and to guide revision strategies. The GCSE Physics June 2013 PH2HP Mark Scheme serves as a quintessential resource for this purpose. This detailed review explores the structure, content, and pedagogical value of the mark scheme, providing insights into how it supports accurate assessment and effective learning.

Understanding the Context of the PH2HP Paper

Before delving into the specifics of the mark scheme, it?s essential to understand the nature of the GCSE Physics June 2013 PH2HP paper.

What is PH2HP?

- PH2HP is a shorthand designation for a particular Physics paper within the GCSE specification, often associated with the higher tier, focusing on core concepts and some additional practical and theoretical topics.
- The paper typically covers topics such as energy, electricity, forces, waves, and particle physics, challenging students to demonstrate both factual recall and application skills.

Relevance of the June 2013 Paper

- The 2013 exam is notable for its question style, difficulty level, and the types of cognitive skills it tests.
- Analyzing the mark scheme from this paper offers valuable insights into examiner expectations for answers, marking conventions, and common pitfalls.

Structure and Components of the Mark Scheme

The mark scheme for the June 2013 PH2HP paper is carefully structured to ensure clarity and consistency in marking. Its design facilitates understanding of what constitutes a correct, complete, and high-quality answer.

General Features of the Mark Scheme

- Mark Allocation: Each question and sub-question has designated marks, indicating the expected

depth and breadth of answers.

- Level of Response: The scheme often categorizes responses into levels (e.g., 1, 2, 3), based on accuracy and detail.
- Model Answers: For open-ended questions, model answers are provided to exemplify what is expected at each mark level.
- Indicative Content: The scheme highlights key points, keywords, and concepts that students should include to secure marks.

Types of Marking Guidance

- Correctness: Marks awarded for factual accuracy.
- Application: Recognition of answers that demonstrate understanding of concepts in context.
- Method and Calculation: Guidance on awarding marks for correct procedures and numerical answers, including working steps.
- Method marks: Sometimes awarded for demonstrating a correct approach, even if the final answer is incorrect.
- Accuracy marks: Awarded for correct final answers, provided the method is sound.

Detailed Breakdown of the Mark Scheme Content

To understand how the mark scheme functions, we examine its treatment of key question types and the standards it sets.

Question Types and Corresponding Marking Strategies

- Multiple-Choice and Short-Answer Questions

- Mark schemes for these are straightforward, awarding a mark for each correct response.
- Common distractors are identified, and partial credit is usually not awarded unless specified.

- Data Handling and Graphs

- Marks are awarded for correct plotting, labeling, and interpretation.
- For graph questions, correctness of axes, scales, and data points is checked meticulously.

- Calculation and Numerical Questions

- Step-by-step marking ensures students demonstrate the correct process.
- For example, in calculations involving energy, force, or speed, the scheme emphasizes units, significant figures, and logical progression.

- Extended Open-Ended Questions

- These often assess understanding and explanation.
- Mark schemes reward clarity, use of scientific terminology, and logical reasoning.
- For example, explaining how a force affects motion or how energy transfer occurs.

Highlights of Key Topics and Marking Criteria

Energy and Power

- Expected Answers: Definitions of energy, power, efficiency, and relevant equations.
- Marking Focus: Correct use of formulas (e.g., \(\text{Power} = \text{Work Done} / \text{Time} \)), units, and detailed explanations.

Electricity

- Expected Answers: Ohm?s Law, circuit components, current, voltage, resistance.
- Marking Focus: Accurate circuit diagrams, correct calculations, and understanding of concepts like series and parallel circuits.

Forces and Motion

- Expected Answers: Newton?s Laws, acceleration, velocity, and forces.
- Marking Focus: Proper application of equations, interpreting graphs, and explaining phenomena.

Waves

- Expected Answers: Types of waves, wave properties, reflection, refraction.
- Marking Focus: Use of correct terminology, explanations of wave behavior, and calculations involving wave speed or frequency.

Particle Physics

- Expected Answers: Atomic structure, radioactive decay, and conservation laws.
- Marking Focus: Accurate descriptions, use of symbols, and understanding of half-life.

Common Marking Pitfalls and How the Scheme Addresses Them

The mark scheme also anticipates typical student errors and provides guidance on awarding partial marks.

- Misuse of Units: The scheme emphasizes the importance of units, awarding marks for correct units and penalizing omissions.
- Incomplete Answers: Partial credit is awarded when students demonstrate partial understanding, such as correctly stating a formula but not executing it fully.
- Misinterpretation of Diagrams: Clear marking criteria specify what constitutes a correctly labeled and accurate diagram.
- Calculation Errors: The scheme distinguishes between procedural mistakes and arithmetic errors, ensuring fair assessment.

Pedagogical Value and Practical Use

The GCSE Physics June 2013 PH2HP mark scheme is invaluable not only for examiners but also for teachers and students.

For Teachers and Marking Accuracy

- Ensures consistency across different markers.
- Acts as a benchmark for grading student responses.
- Guides the development of model answers and revision materials.

For Students and Revision

- Clarifies what examiners seek in answers.

- Highlights essential concepts and common errors.
- Supports targeted revision by understanding marking priorities.

For Curriculum Developers

- Offers insights into assessment standards, helping shape future exam questions and marking criteria.

Conclusion: The Mark Scheme as a Learning Tool

The GCSE Physics June 2013 PH2HP Mark Scheme exemplifies meticulous design aimed at fairness, clarity, and educational value. Its detailed criteria foster an understanding not only of what constitutes correct answers but also of the underlying scientific principles. For students, mastering this mark scheme is akin to learning the examiner?s "checklist," enabling more strategic and confident exam performance. For educators, it provides a foundation for consistent assessment and targeted teaching.

In summary, this mark scheme is a vital resource that enhances the assessment process, supports effective revision, and ultimately contributes to a deeper understanding of GCSE Physics.

QuestionAnswer What are the key topics covered in the GCSE Physics June 2013 PH2HP mark scheme? The mark scheme covers topics such as energy transfer, power, efficiency, electrical circuits, and forces, aligning with the GCSE Physics syllabus for that exam period. How does the mark scheme for June 2013 PH2HP address calculations related to power and efficiency? The mark scheme provides specific guidance on awarding marks for calculations involving power (P = E/t), efficiency (use of the efficiency formula), and includes example questions with step-by-step marking points. What are common misconceptions identified in the June 2013 PH2HP mark scheme for GCSE Physics? Common misconceptions include confusion between energy transfer and power, incorrect use of units, and misunderstandings about the relationship between force, work, and energy, which are addressed explicitly in the mark scheme. How does the June 2013 PH2HP mark scheme differentiate between full and partial credit for exam answers? The mark scheme assigns full marks for correct, complete answers with proper calculations, and partial marks for partially correct methods or steps, clearly indicating which errors still earn some credit to guide examiners. What tips can students use to effectively use the June 2013 PH2HP mark scheme when revising for GCSE Physics? Students should familiarize themselves with the mark scheme to understand common question types, practice applying the marking criteria to their answers, and review model solutions to identify key points and common pitfalls.

Related keywords: GCSE physics, June 2013, PH2HP, mark scheme, physics exam, GCSE physics papers, physics questions June 2013, physics answers, exam marking scheme, physics

grade boundaries

serway physics 8th edition

Serway Physics 8th Edition: An In-Depth Guide for Students and Educators

Serway Physics 8th Edition is a comprehensive textbook widely used by physics students and educators to understand foundational and advanced concepts in physics. Authored by Raymond A. Serway, this edition continues the tradition of providing clear explanations, engaging problems, and real-world applications that enhance the learning experience. Whether you're a student preparing for exams or an instructor seeking a dependable teaching resource, the 8th edition of Serway's physics book offers valuable insights into the fundamental principles of physics, making complex topics accessible and engaging.

Overview of Serway Physics 8th Edition

Key Features and Highlights

- Clear and Concise Explanations: The book breaks down complex physics concepts into easily understandable segments, making it suitable for both beginners and advanced learners.
- Rich Visual Content: The inclusion of detailed diagrams, illustrations, and graphs helps visualize phenomena and reinforce understanding.
- Variety of Problems: The book offers numerous practice problems, from basic to challenging, to test comprehension and develop problem-solving skills.
- Real-World Applications: Examples drawn from everyday life and current technology demonstrate the relevance of physics principles.
- Integrated Learning Tools: Supplementary online resources, including quizzes, animations, and tutorials, are available to enhance the learning experience.

Target Audience

Serway Physics 8th Edition is primarily designed for:

- Undergraduate students taking introductory or intermediate physics courses
- Instructors seeking a reliable textbook for classroom teaching

- Self-learners interested in gaining a solid understanding of physics fundamentals

Content Structure of Serway Physics 8th Edition

Organizational Layout

The book is organized into multiple chapters, each focusing on specific areas of physics, such as mechanics, thermodynamics, electromagnetism, optics, and modern physics. This logical flow ensures a progressive build-up of concepts, facilitating better comprehension.

Major Sections Covered

- Introduction to Physics and Measurement: Fundamentals of scientific measurement, units, and dimensional analysis.
- Kinematics: Describing motion in one and two dimensions.
- Dynamics: Newton's laws, applications, and friction.
- Work, Energy, and Power: Conservation laws and energy transfer.
- Momentum and Collisions: Impulse, conservation of momentum.
- Rotational Motion: Angular velocity, torque, and rotational dynamics.
- Oscillations and Waves: Simple harmonic motion, wave properties.
- Thermodynamics: Heat, temperature, laws of thermodynamics.
- Electromagnetism: Electric fields, circuits, magnetic fields.
- Optics: Reflection, refraction, lenses, and mirrors.
- Modern Physics: Quantum mechanics, atomic physics, nuclear physics.

Why Choose Serway Physics 8th Edition?

Comprehensive Coverage and Depth

The 8th edition provides in-depth explanations of core physics concepts, making it suitable for courses that require a thorough understanding. It balances theory with practical applications, ensuring students grasp both the "how" and the "why."

Effective Learning Resources

The textbook is complemented by online tools, including:

- Interactive simulations
- Video tutorials

- Practice quizzes
- Problem-solving guides

These resources aid in reinforcing learning and preparing for exams effectively.

Updated Content and Pedagogical Approach

The 8th edition incorporates:

- Recent scientific developments
- Updated problem sets reflecting current technology
- Pedagogical features such as summary boxes, key terms, and review questions to facilitate active learning

How to Maximize Learning with Serway Physics 8th Edition

Study Strategies

- Read Actively: Engage with the text by highlighting key points and taking notes.
- Work Through Problems: Practice a variety of problems to strengthen problem-solving skills.
- Use Online Resources: Supplement your study with online tutorials and simulations.
- Form Study Groups: Collaborate with peers to discuss complex topics.
- Regular Review: Revisit previous chapters to reinforce retention.

Supplementary Tools and Resources

- Solution Manuals: For guided problem-solving.
- Online Quizzes: To assess understanding.
- Instructor Resources: Lecture slides and test banks for educators.

Where to Find Serway Physics 8th Edition

Purchasing Options

- Bookstores: Academic and general bookstores often stock the latest editions.
- Online Retailers: Amazon, eBay, and other e-commerce platforms offer new and used copies.
- Digital Versions: E-books and PDF formats available for quick access and portability.

- Library Access: University and public libraries may have copies available for borrowing.

Pricing and Editions

While newer editions are available, the 8th edition remains popular for its proven content and teaching approach. Prices vary based on condition, format, and seller.

Conclusion: The Value of Serway Physics 8th Edition

Choosing the right physics textbook can significantly impact your learning journey. **Serway Physics 8th Edition** stands out as a trusted, comprehensive resource that bridges theory and practice. Its well-structured content, rich visual aids, and variety of problems make it an ideal choice for students aiming to excel in physics. Educators also benefit from its pedagogical features and supplementary resources, making it a versatile tool for effective teaching.

Whether you're tackling your first physics course or delving into more advanced topics, the 8th edition of Serway's physics book provides a solid foundation and a pathway to mastery. Invest in this edition to enhance your understanding of the universe?s fundamental laws and prepare for future scientific pursuits.

Keywords for SEO Optimization:

Serway physics 8th edition, physics textbook, introductory physics, physics problems, physics solutions, physics study guide, physics concepts, physics learning resources, physics for students, physics for educators

Serway Physics 8th Edition: A Comprehensive Review and In-Depth Analysis

Physics textbooks are foundational tools for students and educators alike, serving as both instructional guides and reference materials. Among these, Serway Physics 8th Edition has garnered substantial attention for its thorough content, pedagogical approach, and clarity. This article aims to provide an in-depth, expert-level review of this edition, exploring its features, strengths, and areas for improvement.

Introduction to Serway Physics 8th Edition

Serway Physics 8th Edition, authored primarily by Raymond A. Serway and John W. Jewett, stands as a pivotal resource in college-level physics education. Building upon previous editions, the 8th edition emphasizes conceptual understanding, problem-solving skills, and real-world applications. Its comprehensive coverage spans classical mechanics, electromagnetism, thermodynamics, waves, optics, and modern physics.

This edition is tailored for undergraduate students, aiming to foster both conceptual insight and mathematical proficiency. Its pedagogical design integrates visual aids, examples, and exercises to enhance learning outcomes.

Content Organization and Scope

Structured Approach to Physics Topics

One of the defining features of Serway Physics 8th Edition is its logical, systematic organization of topics. The book begins with fundamental concepts, gradually progressing toward more complex theories. The typical structure includes:

- Mechanics ? motion, forces, energy, momentum
- Thermal Physics ? temperature, heat, thermodynamics
- Electromagnetism ? electric and magnetic fields, circuits
- Waves and Optics ? wave properties, light behavior
- Modern Physics ? quantum mechanics, nuclear physics

This progression ensures students build a solid foundation before tackling advanced material.

Depth and Breadth of Content

The 8th edition offers an expansive treatment of topics, including:

- Classical Mechanics: Newtonian principles, rotational motion, oscillations
- Electromagnetic Theory: Maxwell?s equations, electromagnetic waves
- Thermodynamics: laws of thermodynamics, entropy, applications
- Quantum Physics: photoelectric effect, wave-particle duality
- Nuclear Physics: radioactivity, nuclear reactions

The content depth is appropriate for introductory courses but also provides enough detail for advanced exploration, making it versatile across different levels.

Pedagogical Features and Learning Tools

Clear Explanations and Visual Aids

Serway?s writing style emphasizes clarity. Complex concepts are broken down into manageable parts, often accompanied by diagrams, illustrations, and graphs that clarify the material. For

example:

- Illustrations of vectors, forces, and fields
- Diagrams depicting experimental setups
- Graphs illustrating relationships between variables

These visual tools aid in conceptual understanding and retention.

Worked Examples and Practice Problems

The textbook features numerous worked examples that demonstrate problem-solving techniques step-by-step. These examples are critical for bridging theory and application, fostering analytical skills.

The end-of-chapter problems vary in difficulty, including:

- Basic comprehension questions
- Application-based problems
- Challenging exercises for advanced students

Solutions are provided for selected problems, encouraging self-assessment.

Special Features

- Conceptual Questions: To test understanding beyond calculations
- Summary Sections: Brief overviews of each chapter?s key points
- Real-World Applications: Connecting physics principles to everyday phenomena
- Online Resources: Companion website offering additional quizzes, animations, and supplementary materials

Strengths of Serway Physics 8th Edition

Comprehensive Coverage

The textbook covers a wide array of topics thoroughly, making it suitable for a full semester or even a two-course sequence. Its balanced approach ensures students grasp fundamental principles while appreciating their applications.

Pedagogical Design

The combination of clear explanations, visual aids, and varied exercises caters to diverse learning styles. The inclusion of conceptual questions enhances critical thinking.

Problem-Solving Focus

Serway emphasizes developing problem-solving skills. The step-by-step worked examples and end-of-chapter problems bolster confidence and competence in tackling physics questions.

Quality of Visual Content

High-quality illustrations and diagrams significantly enhance comprehension. Visual learning is particularly vital in physics, where spatial reasoning is often key.

Relevance and Applications

Real-world examples and applications help students see the relevance of physics in everyday life, motivating engagement and curiosity.

Limitations and Areas for Improvement

Mathematical Rigor

While the book balances conceptual and mathematical content, some students may find certain derivations and formulas presented without sufficient background explanation, potentially posing challenges for complete novices.

Digital Integration

Although the accompanying online resources are valuable, their integration could be more seamless. Interactive simulations, for example, could be more prominently featured to enhance engagement.

Coverage of Modern Physics

Modern physics topics, such as quantum mechanics and nuclear physics, are introduced but could benefit from more in-depth discussion or additional supplementary materials for students interested in advanced concepts.

Accessibility

Language and explanations are generally clear, but some sections contain dense technical language that may require supplementary tutoring or guidance for struggling readers.

Comparison with Other Textbooks

When compared to other introductory physics texts like Halliday & Resnick or Knight?s Physics for Scientists and Engineers, Serway 8th Edition holds its own in clarity and pedagogical approach. Its strengths lie in the structured presentation and emphasis on conceptual understanding.

However, some educators and students prefer the more mathematically rigorous or application-focused content found in alternative texts. The choice ultimately depends on the course objectives and student preparedness.

Target Audience and Usage Recommendations

Serway Physics 8th Edition is ideally suited for:

- Undergraduate students taking introductory physics courses
- Instructors seeking a balanced, student-friendly textbook
- Self-learners interested in foundational physics concepts

For maximum benefit, students should complement the textbook with online simulations, problem-solving practice, and supplemental resources, especially if they aim to pursue more advanced physics topics.

Conclusion: Is Serway Physics 8th Edition a Worthy Investment?

In sum, Serway Physics 8th Edition remains a highly valuable resource in the realm of introductory physics education. Its comprehensive coverage, pedagogical clarity, and emphasis on problem-solving make it a dependable choice for students and educators alike.

While it has areas where enhancements could be made?particularly in integrating more interactive digital content and expanding on modern physics topics?it continues to serve as a robust foundation for understanding the physical universe.

For those seeking a well-structured, conceptually rich, and pedagogically sound physics textbook, Serway Physics 8th Edition stands out as a commendable option that can support learning at various levels of expertise.

QuestionAnswer What are the main topics covered in Serway Physics 8th Edition? Serway

Physics 8th Edition covers fundamental topics such as mechanics, thermodynamics, electromagnetism, optics, and modern physics, providing a comprehensive overview suitable for introductory physics courses. How does Serway Physics 8th Edition incorporate real-world applications? The book integrates real-world examples and problem-solving scenarios to help students understand the practical relevance of physics principles in everyday life and technological advancements. Are there online resources or supplements available for Serway Physics 8th Edition? Yes, students can access online resources like solution manuals, practice problems, and interactive tutorials through the publisher's website to enhance their learning experience. What are the most effective ways to use Serway Physics 8th Edition for exam preparation? Focus on understanding core concepts, practice end-of-chapter problems, utilize online resources, and review summary sections to reinforce learning and prepare effectively for exams. How does Serway Physics 8th Edition address modern physics topics? The edition introduces modern physics topics such as quantum mechanics, atomic physics, and relativity, providing foundational knowledge aligned with current scientific understanding. Is Serway Physics 8th Edition suitable for self-study students? Yes, the clear explanations, worked examples, and problem sets make it a valuable resource for self-study students seeking to learn physics independently. What are the updates or new features in Serway Physics 8th Edition compared to previous editions? The 8th edition includes updated problem sets, new illustrations, expanded sections on contemporary physics topics, and enhanced online resources to improve clarity and engagement. Can Serway Physics 8th Edition help with understanding laboratory physics experiments? While primarily a theoretical textbook, it offers explanations of fundamental principles behind experiments, aiding students in understanding laboratory concepts and procedures. How do instructors typically incorporate Serway Physics 8th Edition into their curriculum? Instructors use the book for lecture material, assign problem sets from the end-of-chapter exercises, and leverage the online resources to supplement classroom instruction.

Related keywords: Serway physics, physics textbook, college physics, physics problems, physics solutions, physics exercises, physics concepts, physics study guide, physics practice problems, introductory physics

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