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REPUBLIC OF SOUTH AFRICA

# FULL MEMORANDUM GRADE 12 PHYSICS 2022 FINAL

This question paper consists of 18 pages and 3 data sheets.

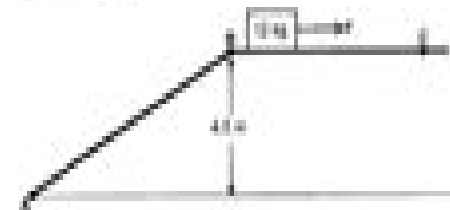
(QUESTION 5 (Start on a new page.)

A 12 kg block is initially at rest at point A at the bottom of a ROUGH inclined plane. The block is pulled up the incline by a constant force  $F$  acting parallel to the incline. The block reaches point B, which is at a vertical height of 4.0 m above the horizontal, with a speed of 2.0 m/s. See the diagram below.



- Define the term non-conservative force.
- Draw a labelled free-body diagram for the block when it is pulled up the incline.
- Calculate the total work done on the block by the NON-CONSERVATIVE forces when the block moves from point A to point B. (5)

The same constant force  $F$  now moves the block at a CONSTANT VELOCITY across a rough horizontal surface from point B to point C, as shown below. Force  $F$  acts parallel to the horizontal surface.



The magnitude of the constant frictional force acting on the block while moving from point B to point C is 40 N, 40% of the magnitude of the constant frictional force acting on the block when it moves from point A to point B.

- Calculate the distance from point A to point B. (5)

(10)

# Physical Science P1 November Memo 2014

**Ian F. Putnam**



**Physical Science P1 November Memo 2014:**

A Homology Theory for Smale Spaces Ian F. Putnam, 2014-09-29 The author develops a homology theory for Smale spaces which include the basic sets for an Axiom A diffeomorphism. It is based on two ingredients. The first is an improved version of Bowen's result that every such system is the image of a shift of finite type under a finite-to-one factor map. The second is Krieger's dimension group invariant for shifts of finite type. He proves a Lefschetz formula which relates the number of periodic points of the system for a given period to trace data from the action of the dynamics on the homology groups. The existence of such a theory was proposed by Bowen in the 1970s.

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## **Table of Contents Physical Science P1 November Memo 2014**

1. Understanding the eBook Physical Science P1 November Memo 2014
  - The Rise of Digital Reading Physical Science P1 November Memo 2014
  - Advantages of eBooks Over Traditional Books
2. Identifying Physical Science P1 November Memo 2014
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Physical Science P1 November Memo 2014
  - User-Friendly Interface
4. Exploring eBook Recommendations from Physical Science P1 November Memo 2014
  - Personalized Recommendations
  - Physical Science P1 November Memo 2014 User Reviews and Ratings
  - Physical Science P1 November Memo 2014 and Bestseller Lists
5. Accessing Physical Science P1 November Memo 2014 Free and Paid eBooks
  - Physical Science P1 November Memo 2014 Public Domain eBooks
  - Physical Science P1 November Memo 2014 eBook Subscription Services
  - Physical Science P1 November Memo 2014 Budget-Friendly Options

6. Navigating Physical Science P1 November Memo 2014 eBook Formats
  - ePub, PDF, MOBI, and More
  - Physical Science P1 November Memo 2014 Compatibility with Devices
  - Physical Science P1 November Memo 2014 Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Physical Science P1 November Memo 2014
  - Highlighting and Note-Taking Physical Science P1 November Memo 2014
  - Interactive Elements Physical Science P1 November Memo 2014
8. Staying Engaged with Physical Science P1 November Memo 2014
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Physical Science P1 November Memo 2014
9. Balancing eBooks and Physical Books Physical Science P1 November Memo 2014
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Physical Science P1 November Memo 2014
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Physical Science P1 November Memo 2014
  - Setting Reading Goals Physical Science P1 November Memo 2014
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Physical Science P1 November Memo 2014
  - Fact-Checking eBook Content of Physical Science P1 November Memo 2014
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
  - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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