

# PHYSICAL SCIENCES

## PAPER 1

## MAY-JUNE

## MEMO

# 2025



Figure 1 is a circuit diagram used for Question 1. The voltmeter is connected in parallel with the battery.

1.1 (4 marks)  
State the meaning of potential difference across a component.  
Answer: The difference in potential energy per unit charge between two points in the circuit.



- 2.1 (2 marks) Calculate the moment of the weight about the pivot.  
2.2 (2 marks) Calculate the magnitude of the force F required to balance the beam.



basic education

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REPUBLIC OF SOUTH AFRICA

# Physical Science Paper 2013 Memo

**Hussin A.Rothana**

A red circular graphic with a gradient, appearing as a semi-circle or a partial circle, located to the right of the author's name.

## **Physical Science Paper 2013 Memo:**

**Robust Methods for the Analysis of Images and Videos for Fisheries Stock Assessment** National Research Council, Division on Engineering and Physical Sciences, Board on Mathematical Sciences and Their Applications, Committee on Applied and Theoretical Statistics, 2015-02-24 The National Marine Fisheries Service NMFS is responsible for the stewardship of the nation's living marine resources and their habitat. As part of this charge NMFS conducts stock assessments of the abundance and composition of fish stocks in several bodies of water. At present stock assessments rely heavily on human data gathering and analysis. Automatic means of fish stock assessments are appealing because they offer the potential to improve efficiency and reduce human workload and perhaps develop higher fidelity measurements. The use of images and video when accompanied by appropriate statistical analyses of the inferred data is of increasing importance for estimating the abundance of species and their age distributions. **Robust Methods for the Analysis of Images and Videos for Fisheries Stock Assessment** is the summary of a workshop convened by the National Research Council Committee on Applied and Theoretical Statistics to discuss analysis techniques for images and videos for fisheries stock assessment. Experts from diverse communities shared perspective about the most efficient path toward improved automation of visual information and discussed both near term and long term goals that can be achieved through research and development efforts. This report is a record of the presentations and discussions of this event.

**Corporate Social Responsibility** James Weber, David Wasieleski, 2018-05-14 Volume Two of *Business and Society* 360 focuses on research drawn from work grounded in corporate social responsibility and corporate citizenship.

*Twort's Water Supply* Malcolm J. Brandt, K. Michael Johnson, Andrew J. Elphinston, Don D. Ratnayaka, 2016-09-03 *Twort's Water Supply* Seventh Edition has been expanded to provide the latest tools and techniques to meet engineering challenges over dwindling natural resources. Approximately 1.1 billion people in rural and peri urban communities of developing countries do not have access to safe drinking water. The mortality from diarrhea related diseases amounts to 2.2 million people each year from the consumption of unsafe water. This update reflects the latest WHO, European, UK and US standards including the European Water Framework Directive. The book also includes an expansion of waste and sludge disposal including energy and sustainability and new chapters on intakes, chemical storage, handling and sampling. Written for both professionals and students, this book is essential reading for anyone working in water engineering. Features expanded coverage of waste and sludge disposal to include energy use and sustainability. Includes a new chapter on intakes. Includes a new chapter on chemical storage and handling.

**Managing Medical Devices within a Regulatory Framework** Beth Ann Fiedler, 2016-09-10 *Managing Medical Devices within a Regulatory Framework* helps administrators, designers, manufacturers, clinical engineers and biomedical support staff to navigate worldwide regulation, carefully consider the parameters for medical equipment, patient safety, anticipate problems with equipment and efficiently manage medical device acquisition budgets throughout the total product life cycle. This contributed book contains

perspectives from industry professionals and academics providing a comprehensive look at health technology management HTM best practices for medical records management interoperability between and among devices outside of healthcare and the dynamics of implementation of new devices Various chapters advise on how to achieve patient confidentiality compliance for medical devices and their software discuss legal issues surrounding device use in the hospital environment of care the impact of device failures on patient safety methods to advance skillsets for HTM professionals and resources to assess digital technology The authors bring forth relevant challenges and demonstrate how management can foster increased clinical and non clinical collaboration to enhance patient outcomes and the bottom line by translating the regulatory impact on operational requirements Covers compliance with FDA and CE regulations plus EU directives for service and maintenance of medical devices Provides operational and clinical practice recommendations in regard to regulatory changes for risk management Discusses best practices for equipment procurement and maintenance Provides guidance on dealing with the challenge of medical records management and compliance with patient confidentiality using information from medical devices

**STEM Education Across the Learning Continuum** Amy MacDonald,Lena Danaia,Steve Murphy,2020-02-18 This is the first comprehensive book to consider STEM education from early childhood through to senior secondary education It approaches STEM as a form of real world problem based education that draws on the knowledge and skills of the science technology engineering and mathematics disciplines Rather than presenting each of the separate disciplines to an equal extent it focuses on STEM researchers perspectives on how their work contributes to effective STEM education in terms of building knowledge skills and engagement Gathering contributions by authors from various countries the book explores effective STEM education from a range of perspectives within the international context Moreover it addresses critical issues in STEM education including transition and trajectories gender rurality socioeconomic status and cultural diversity By doing so it not only shares the current state of knowledge in this field but also offers a source of inspiration for future research

**Where Have All the Democrats Gone?** Ruy Teixeira,John B. Judis,2023-11-07 A Wall Street Journal Best Political Book of 2023 A much needed wake up call for the Democrats which reveals how the party has lost sight of its core principles and endangered its political future from the authors of one of the most influential political books of the 21st century The New York Times For decades American politics has been plagued by a breakdown between the Democratic and Republican parties in which victory has inevitably led to defeat and vice versa Both parties have lost sight of the people at the center of the American electorate leading to polarization and paralysis In Where Have All the Democrats Gone John B Judis and Ruy Teixeira reveal the tectonic changes shaping the country s current political landscape that both pundits and political scientists have missed The Democratic Party once the preserve of small towns as well as big cities and of the industrial working class and the newly immigrated has abandoned and even actively alienated many of these voters In this clarion call and essential argument for common sense and common ground Judis and Teixeira reveal the transformation of American

politics and provide a razor sharp critique of where the Democrats have gone awry and how they can avoid political disaster in the days ahead

**Treatise on Geomorphology**, 2013-02-27 The changing focus and approach of geomorphic research suggests that the time is opportune for a summary of the state of discipline The number of peer reviewed papers published in geomorphic journals has grown steadily for more than two decades and more importantly the diversity of authors with respect to geographic location and disciplinary background geography geology ecology civil engineering computer science geographic information science and others has expanded dramatically As more good minds are drawn to geomorphology and the breadth of the peer reviewed literature grows an effective summary of contemporary geomorphic knowledge becomes increasingly difficult The fourteen volumes of this Treatise on Geomorphology will provide an important reference for users from undergraduate students looking for term paper topics to graduate students starting a literature review for their thesis work and professionals seeking a concise summary of a particular topic Information on the historical development of diverse topics within geomorphology provides context for ongoing research discussion of research strategies equipment and field methods laboratory experiments and numerical simulations reflect the multiple approaches to understanding Earth s surfaces and summaries of outstanding research questions highlight future challenges and suggest productive new avenues for research Our future ability to adapt to geomorphic changes in the critical zone very much hinges upon how well landform scientists comprehend the dynamics of Earth s diverse surfaces This Treatise on Geomorphology provides a useful synthesis of the state of the discipline as well as highlighting productive research directions that Educators and students researchers will find useful Geomorphology has advanced greatly in the last 10 years to become a very interdisciplinary field Undergraduate students looking for term paper topics to graduate students starting a literature review for their thesis work and professionals seeking a concise summary of a particular topic will find the answers they need in this broad reference work which has been designed and written to accommodate their diverse backgrounds and levels of understanding Editor in Chief Prof J F Shroder of the University of Nebraska at Omaha is past president of the QG G section of the Geological Society of America and present Trustee of the GSA Foundation while being well respected in the geomorphology research community and having won numerous awards in the field A host of noted international geomorphologists have contributed state of the art chapters to the work Readers can be guaranteed that every chapter in this extensive work has been critically reviewed for consistency and accuracy by the World expert Volume Editors and by the Editor in Chief himself No other reference work exists in the area of Geomorphology that offers the breadth and depth of information contained in this 14 volume masterpiece From the foundations and history of geomorphology through to geomorphological innovations and computer modelling and the past and future states of landform science no stone has been left unturned

**The EU, the US and Global Climate Governance** Christine Bakker, Francesco Francioni, 2016-02-17 This volume presents a critical analysis of transatlantic relations in the field of environmental governance and climate change The work focuses on understanding the possible

trends in the evolution of global environmental governance and the prospects for breaking the current impasse on climate action Drawing on research involving experts from eleven different universities and institutes the authors provide innovative analyses on policy measures taken by the EU and the US the world s largest economic and commercial blocs in a number of fields ranging from general attitudes on environmental leadership with regard to climate change to energy policies new technologies for hydrocarbons extraction and carbon capture as well as the effects of extreme weather events on climate related political attitudes The book examines the way in which the current attitudes of the EU and the US with regard to climate change will affect international cooperation and the building of consensus on possible climate policies and looks to the future for international environmental governance arguably one of the most pressing concerns of civilisation today This book which is based on research carried out in the context of the EU financed FP7 research project TRANSWORLD will appeal to academics policy makers and practitioners seeking a deeper understanding of the challenges resulting from climate change

*Strategies for Team Science Success* Kara L. Hall, Amanda L. Vogel, Robert T. Croyle, 2019-11-13 Collaborations that integrate diverse perspectives are critical to addressing many of our complex scientific and societal problems Yet those engaged in cross disciplinary team science often face institutional barriers and collaborative challenges *Strategies for Team Science Success* offers readers a comprehensive set of actionable strategies for reducing barriers and overcoming challenges and includes practical guidance for how to implement effective team science practices More than 100 experts including scientists administrators and funders from a wide range of disciplines and professions explain evidence based principles highlight state of the art strategies tools and resources and share first person accounts of how they ve applied them in their own successful team science initiatives While many examples draw from cross disciplinary team science initiatives in the health domain the handbook is designed to be useful across all areas of science *Strategies for Team Science Success* will inspire and enable readers to embrace cross disciplinary team science by articulating its value for accelerating scientific progress and by providing practical strategies for success Scientists administrators funders and others engaged in team science will also leave equipped to develop new policies and practices needed to keep pace in our rapidly changing scientific landscape Scholars across the Science of Team Science SciTS management organizational behavioral and social sciences public health philosophy and information technology among other areas of scholarship will find inspiration for new research directions to continue advancing cross disciplinary team science

**Native Games** Chris Hallinan, Barry Judd, 2013-07-19 Research on Indigenous participation in sport offers many opportunities to better understand the political issues of equality empowerment self determination and protection of culture and identity This volume compares and conceptualises the sociological significance of Indigenous sports in different international contexts

**Encyclopedia of the Anthropocene**, 2017-11-27 *Encyclopedia of the Anthropocene* Five Volume Set presents a currency based global synthesis cataloguing the impact of humanity s global ecological footprint Covering a multitude of aspects related to Climate Change Biodiversity

Contaminants Geological Energy and Ethics leading scientists provide foundational essays that enable researchers to define and scrutinize information ideas relationships meanings and ideas within the Anthropocene concept Questions widely debated among scientists humanists conservationists politicians and others are included providing discussion on when the Anthropocene began what to call it whether it should be considered an official geological epoch whether it can be contained in time and how it will affect future generations Although the idea that humanity has driven the planet into a new geological epoch has been around since the dawn of the 20th century the term Anthropocene was only first used by ecologist Eugene Stoermer in the 1980s and hence popularized in its current meaning by atmospheric chemist Paul Crutzen in 2000 Presents comprehensive and systematic coverage of topics related to the Anthropocene with a focus on the Geosciences and Environmental science Includes point counterpoint articles debating key aspects of the Anthropocene giving users an even handed navigation of this complex area Provides historic seminal papers and essays from leading scientists and philosophers who demonstrate changes in the Anthropocene concept over time

**Waves on Beaches and Resulting Sediment Transport** R. E. Meyer, 2013-09-24 Waves on Beaches and Resulting Sediment Transport documents the proceedings of an Advanced Seminar held in October 1971 aiming to offer a coherent interdisciplinary view of the state of physical research in coastal oceanography and the direction in which this subject is moving The articles range from wave refraction to littoral erosion and the authors from geologists to mathematicians The book opens with a study on the characteristics of wave records in the coastal zone This is followed by separate chapters on sediment transport in beaches equations for water waves small amplitude normal oscillations of a liquid body and wave behavior near caustics in models and in nature Subsequent chapters deal with nonlinear wave interaction in a variety of physical phenomena including deep water waves the study of longshore currents sediment suspension by periodic waves forms of sediment accumulation in the beach zone run up on beaches and the wave breaking process in shallow water *Nuclear Science Abstracts*, 1972

**Strengthening Data Science Methods for Department of Defense Personnel and Readiness Missions** National Academies of Sciences, Engineering, and Medicine, Division on Engineering and Physical Sciences, Board on Mathematical Sciences and Their Applications, Committee on Applied and Theoretical Statistics, Committee on Strengthening Data Science Methods for Department of Defense Personnel and Readiness Missions, 2017-02-06 The Office of the Under Secretary of Defense Personnel Readiness referred to throughout this report as P R is responsible for the total force management of all Department of Defense DoD components including the recruitment readiness and retention of personnel Its work and policies are supported by a number of organizations both within DoD including the Defense Manpower Data Center DMDC and externally including the federally funded research and development centers FFRDCs that work for DoD P R must be able to answer questions for the Secretary of Defense such as how to recruit people with an aptitude for and interest in various specialties and along particular career tracks and how to assess on an ongoing basis service members career satisfaction and

their ability to meet new challenges P R must also address larger scale questions such as how the current realignment of forces to the Asia Pacific area and other regions will affect recruitment readiness and retention While DoD makes use of large scale data and mathematical analysis in intelligence surveillance reconnaissance and elsewhere exploiting techniques such as complex network analysis machine learning streaming social media analysis and anomaly detection these skills and capabilities have not been applied as well to the personnel and readiness enterprise Strengthening Data Science Methods for Department of Defense Personnel and Readiness Missions offers and roadmap and implementation plan for the integration of data analysis in support of decisions within the purview of P R      **The Neural Mind** George Lakoff, Srin

Narayanan, 2025-06-24 Offers an expansive unified theory of thought that brings together the vast resources of neuroscience computation and cognitive linguistics What is an idea and where does it come from We experience thought as if it were abstract but every thought is actually a physical thing carried out by the neural systems of our brains Thought does not occur neuron by neuron it happens when neurons come together to form circuits and when simple circuits combine to form complex ones Thoughts then derive their structures from the circuitry we also use for vision touch and hearing This circuitry is what allows simple thoughts to come together into complex concepts making meaning creating metaphors and framing our social and political ideas With **The Neural Mind** George Lakoff a pioneering cognitive linguist and computer scientist Srin Narayanan deftly combine insights from cognitive science computational modeling and linguistics to show how thoughts arise from the neural circuitry that runs throughout our bodies They answer key questions about the ways we make meaning How does neural circuitry create the conceptual frames through which we understand our social lives What kind of neural circuitry characterizes metaphorical thought in which ideas are understood in terms of other ideas with similar structures Lively and accessible the book shows convincingly that the metaphors we live by to use Lakoff's famous phrase aren't abstractions but deeply embodied neural constructs **The Neural Mind** is the first book of its kind bringing together the ideas of multiple disciplines to offer a unified accessible theory of thought A field defining work Lakoff and Narayanan's book will be of interest not just to linguists and cognitive scientists but also to psychologists philosophers anthropologists journalists sociologists and political scientists and anyone who wants to understand how we really think      **Handbook of Clean**

**Energy Systems, 6 Volume Set** Jinyue Yan, 2015-06-22 The Handbook of Clean Energy Systems brings together an international team of experts to present a comprehensive overview of the latest research developments and practical applications throughout all areas of clean energy systems Consolidating information which is currently scattered across a wide variety of literature sources the handbook covers a broad range of topics in this interdisciplinary research field including both fossil and renewable energy systems The development of intelligent energy systems for efficient energy processes and mitigation technologies for the reduction of environmental pollutants is explored in depth and environmental social and economic impacts are also addressed Topics covered include Volume 1 Renewable Energy Biomass resources and



biofuel production Bioenergy Utilization Solar Energy Wind Energy Geothermal Energy Tidal Energy Volume 2 Clean Energy Conversion Technologies Steam Vapor Power Generation Gas Turbines Power Generation Reciprocating Engines Fuel Cells Cogeneration and Polygeneration Volume 3 Mitigation Technologies Carbon Capture Negative Emissions System Carbon Transportation Carbon Storage Emission Mitigation Technologies Efficiency Improvements and Waste Management Waste to Energy Volume 4 Intelligent Energy Systems Future Electricity Markets Diagnostic and Control of Energy Systems New Electric Transmission Systems Smart Grid and Modern Electrical Systems Energy Efficiency of Municipal Energy Systems Energy Efficiency of Industrial Energy Systems Consumer Behaviors Load Control and Management Electric Car and Hybrid Car Energy Efficiency Improvement Volume 5 Energy Storage Thermal Energy Storage Chemical Storage Mechanical Storage Electrochemical Storage Integrated Storage Systems Volume 6 Sustainability of Energy Systems Sustainability Indicators Evaluation Criteria and Reporting Regulation and Policy Finance and Investment Emission Trading Modeling and Analysis of Energy Systems Energy vs Development Low Carbon Economy Energy Efficiencies and Emission Reduction Key features Comprising over 3 500 pages in 6 volumes HCES presents a comprehensive overview of the latest research developments and practical applications throughout all areas of clean energy systems consolidating a wealth of information which is currently scattered across a wide variety of literature sources In addition to renewable energy systems HCES also covers processes for the efficient and clean conversion of traditional fuels such as coal oil and gas energy storage systems mitigation technologies for the reduction of environmental pollutants and the development of intelligent energy systems Environmental social and economic impacts of energy systems are also addressed in depth Published in full colour throughout Fully indexed with cross referencing within and between all six volumes Edited by leading researchers from academia and industry who are internationally renowned and active in their respective fields Published in print and online The online version is a single publication i e no updates available for one time purchase or through annual subscription

*Energy and Combustion Science* N. A. Chigier, 2013-10-22 Energy and Combustion Science is a collection of papers that covers advancement in the field of energy and combustion science The materials presented in the book are organized thematically into parts The text first covers the issues concerns problems of the contemporary combustion technology The subsequent parts of the book cover various areas in combustions science namely pollution gas oil coal and engines Most of the articles in the book are concerned with the byproduct of fuel combustion The text will be of great use to students researchers and practitioners of disciplines that deal with the energy and combustion technology

**Early Childhood Studies** Jane Johnston, Lindy Nahmad-Williams, Ruby Oates, Val Wood, 2018-02-16 This fully updated new edition offers a comprehensive accessible yet rigorous introduction to the study of Early Childhood that will add value to any Early Childhood Studies course at both foundation and degree level Addressing both care and education in the Early Years the book considers a range of multi disciplinary aspects of Early Childhood including health social educational psychological and

sociological perspectives Early Childhood Studies engages the reader by providing real world examples that underpin theoretical perspectives and bring examples to life while encouraging practitioners to engage in reflective practice by considering their own similar experiences Key features include Engaging activities and case studies that bring theory to life Cutting edge research Practical tasks and advice with points for further reading End of chapter summaries Reflective Tasks and Study Skills boxes in each chapter Full colour illustrations throughout This core introductory textbook is an indispensable resource for Early Years students and professionals whatever their level of expertise or experience Treatise on Geophysics, Volume 10 Tilman Spohn, 2010-05-20 Planets and Moons covers topics relating to the physics of the major planetary bodies in the solar system starting with an introductory description of the solar system and collection of pertinent data continuing with a discussion of the early history of the planets and finishing with articles about planet dynamics thermal evolution of planets and satellites and descriptions of their magnetic fields and the processes that generate them In addition to providing a review on the solid planets and the satellites this volume addresses the interactions of solid surfaces and atmospheres as well as the roles of water and ice in shaping the surfaces of planetary bodies Self contained volume starts with an overview of the subject then explores each topic with in depth detail Extensive reference lists and cross references with other volumes to facilitate further research Full color figures and tables support the text and aid in understanding Content suited for both the expert and non expert *Spacecraft Dynamics and Control* Enrico Canuto, Carlo Novara, Donato Carlucci, Carlos Perez-Montenegro, Luca Massotti, 2018-03-08 Spacecraft Dynamics and Control The Embedded Model Control Approach provides a uniform and systematic way of approaching space engineering control problems from the standpoint of model based control using state space equations as the key paradigm for simulation design and implementation The book introduces the Embedded Model Control methodology for the design and implementation of attitude and orbit control systems The logic architecture is organized around the embedded model of the spacecraft and its surrounding environment The model is compelled to include disturbance dynamics as a repository of the uncertainty that the control law must reject to meet attitude and orbit requirements within the uncertainty class The source of the real time uncertainty estimation prediction is the model error signal as it encodes the residual discrepancies between spacecraft measurements and model output The embedded model and the uncertainty estimation feedback noise estimator in the book constitute the state predictor feeding the control law Asymptotic pole placement exploiting the asymptotes of closed loop transfer functions is the way to design and tune feedback loops around the embedded model state predictor control law reference generator The design versus the uncertainty class is driven by analytic stability and performance inequalities The method is applied to several attitude and orbit control problems The book begins with an extensive introduction to attitude geometry and algebra and ends with the core themes state space dynamics and Embedded Model Control Fundamentals of orbit attitude and environment dynamics are treated giving emphasis to state space formulation disturbance dynamics state feedback and

prediction closed loop stability Sensors and actuators are treated giving emphasis to their dynamics and modelling of measurement errors Numerical tables are included and their data employed for numerical simulations Orbit and attitude control problems of the European GOCE mission are the inspiration of numerical exercises and simulations The suite of the attitude control modes of a GOCE like mission is designed and simulated around the so called mission state predictor Solved and unsolved exercises are included within the text and not separated at the end of chapters for better understanding training and application Simulated results and their graphical plots are developed through MATLAB Simulink code

## Reviewing **Physical Science Paper 2013 Memo**: Unlocking the Spellbinding Force of Linguistics

In a fast-paced world fueled by information and interconnectivity, the spellbinding force of linguistics has acquired newfound prominence. Its capacity to evoke emotions, stimulate contemplation, and stimulate metamorphosis is actually astonishing. Within the pages of "**Physical Science Paper 2013 Memo**," an enthralling opus penned by a highly acclaimed wordsmith, readers embark on an immersive expedition to unravel the intricate significance of language and its indelible imprint on our lives. Throughout this assessment, we shall delve to the book is central motifs, appraise its distinctive narrative style, and gauge its overarching influence on the minds of its readers.

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