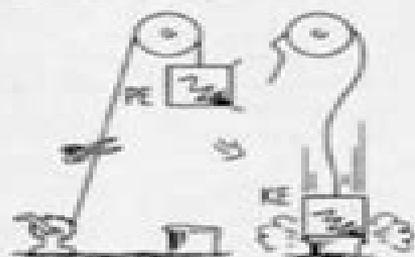
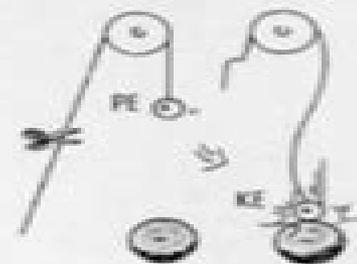


Chapter 21: Electrostatics
Electric Potential



Just as PE transforms to KE for a mass lifted against the gravitation field (left), the electric PE of an electric charge transforms to other forms of energy when it changes location in an electric field (right). In both cases, how does the KE acquired compare to the decrease in PE?



Complete the statements.



A force compresses the spring. The work done in compression is the product of the average force and the distance moved. $W = Fd$. This work increases the PE of the spring.

Similarly, a force pushes the charge (call it a test charge) closer to the charged sphere. The work done in moving the test charge is the product of the average _____ and the _____ moved. $W = \underline{\hspace{2cm}}$. This work _____ the PE of the test charge.



If the test charge is released, it will be repelled and fly past the starting point. Its gain in KE at this point is _____ to its decrease in PE.

At any point, a greater amount of test charge means a greater amount of PE. But not a greater amount of PE *per amount of charge*. The quantities PE (measured in joules) and PE/charge (measured in volts) are different concepts.

By definition: **Electric Potential = PE/charge**. 1 volt = 1 joule/1 coulomb. So 1 C of charge with a PE of 1 J has an electric potential of 1 V. And 2 C of charge with a PE of 2 J has an electric potential of _____ V.



If a conductor connected to the terminal of a battery has an electric potential of 12 V, then each coulomb of charge on the conductor has a PE of _____ J.



You do very little work in rubbing a balloon on your hair to charge it. The PE of several thousand billion electrons (about one-millionth coulomb [$10^{-6}C$]) transferred may be a thousandth of a joule [$10^{-3}J$]. Impressively, however, the electric potential of the balloon is about _____ V!

Why is contact with a balloon charged to thousands of volts not as dangerous as contact with household 110 V? _____

Conceptual Physics Concept Development Practice

Chapter 21

S Ben Porath



Conceptual Physics Concept Development Practice Chapter 21:

The Mangle of Practice Andrew Pickering, 2010-12-15 This ambitious book by one of the most original and provocative thinkers in science studies offers a sophisticated new understanding of the nature of scientific mathematical and engineering practice and the production of scientific knowledge Andrew Pickering offers a new approach to the unpredictable nature of change in science taking into account the extraordinary number of factors social technological conceptual and natural that interact to affect the creation of scientific knowledge In his view machines instruments facts theories conceptual and mathematical structures disciplined practices and human beings are in constantly shifting relationships with one another mangled together in unforeseeable ways that are shaped by the contingencies of culture time and place Situating material as well as human agency in their larger cultural context Pickering uses case studies to show how this picture of the open changeable nature of science advances a richer understanding of scientific work both past and present Pickering examines in detail the building of the bubble chamber in particle physics the search for the quark the construction of the quaternions system in mathematics and the introduction of computer controlled machine tools in industry He uses these examples to address the most basic elements of scientific practice the development of experimental apparatus the production of facts the development of theory and the interrelation of machines and social organization Handbook of Educational Psychology David C. Berliner, Robert C. Calfee, 2004 Sponsored by Division 15 of APA the second edition of this groundbreaking book has been expanded to 41 chapters that provide unparalleled coverage of this far ranging field Internationally recognized scholars contribute up to date reviews and critical syntheses of the following areas foundations and the future of educational psychology learners development individual differences cognition motivation content area teaching socio cultural perspectives on teaching and learning teachers and teaching instructional design teacher assessment and modern perspectives on research methodologies data and data analysis New chapters cover topics such as adult development self regulation changes in knowledge and beliefs and writing Expanded treatment has been given to cognition motivation and new methodologies for gathering and analyzing data The Handbook of Educational Psychology Second Edition provides an indispensable reference volume for scholars teacher educators in service practitioners policy makers and the academic libraries serving these audiences It is also appropriate for graduate level courses devoted to the study of educational psychology s teacher educators in service practitioners policy makers and the academic libraries serving these audiences It is also appropriate for graduate level courses devoted to the study of educational psychology *El-Hi Textbooks & Serials in Print, 2005*, 2005 **Advances in Reversal Theory** M.J. Apter, J.H. Kerr, S. Murgatroyd, 1993-01-01 Explores some of the recent thinking in psychology along the lines that people are inherently inconsistent over time and that the differences within an individual are as important as the differences among individuals The 26 papers most presented at conferences since 1988 and many researchers have Resources in Education, 1988 **Engineering Education** John Heywood, 2005-11-11 A

synthesis of nearly 2 000 articles to help make engineers better educators While a significant body of knowledge has evolved in the field of engineering education over the years much of the published information has been restricted to scholarly journals and has not found a broad audience This publication rectifies that situation by reviewing the findings of nearly 2 000 scholarly articles to help engineers become better educators devise more effective curricula and be more effective leaders and advocates in curriculum and research development The author s first objective is to provide an illustrative review of research and development in engineering education since 1960 His second objective is with the examples given to encourage the practice of classroom assessment and research and his third objective is to promote the idea of curriculum leadership The publication is divided into four main parts Part I demonstrates how the underpinnings of education history philosophy psychology sociology determine the aims and objectives of the curriculum and the curriculum s internal structure which integrates assessment content teaching and learning Part II focuses on the curriculum itself considering such key issues as content organization trends and change A chapter on interdisciplinary and integrated study and a chapter on project and problem based models of curriculum are included Part III examines problem solving creativity and design Part IV delves into teaching assessment and evaluation beginning with a chapter on the lecture cooperative learning and teamwork The book ends with a brief insightful forecast of the future of engineering education Because this is a practical tool and reference for engineers each chapter is self contained and may be read independently of the others Unlike other works in engineering education which are generally intended for educational researchers this publication is written not only for researchers in the field of engineering education but also for all engineers who teach All readers acquire a host of practical skills and knowledge in the fields of learning philosophy sociology and history as they specifically apply to the process of engineering curriculum improvement and evaluation

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