Answers

$Q = mc\Delta T$, where Q = heat energy, m = mass, and ΔT = change in temp. Remember, $\Delta T = (T_{final} - T_{initial})$. <u>Show all work</u> and proper units.

1. A 15.75-g piece of iron absorbs 1086.75 joules of heat energy, and its temperature changes from 25°C to 175°C. Calculate the specific heat capacity of iron.

   $$C = \frac{Q}{m(T_f-T_i)} = \frac{1086.75}{15.75(175-25)} = \text{0.46 J/g°C}$$

2. How many joules of heat are needed to raise the temperature of 10.0 g of aluminum from 22°C to 55°C, if the specific heat of aluminum is 0.90 J/g°C?

   $$Q = mC(T_f - T_i) = 10.0g \, (0.90J/g°C)(55-22) = \text{297 J}$$

3. Calculate the specific heat capacity of a piece of wood if 1500.0 g of the wood absorbs 67,500 joules of heat, and its temperature changes from 32°C to 57°C.

   $$C = \frac{Q}{m(T_f-T_i)} = \frac{67500 \, J}{(1500 \, g)(57-32)} = \text{1.8 J/g°C}$$

4. 100.0 g of 4.0°C water is heated until its temperature is 37°C. Calculate the amount of heat energy needed to cause this rise in temperature.

   $$Q = mC(T_f-T_i) = 100g(4.184J/g°C)(37 - 4) = \text{14000 J}$$

5. 25.0 g of mercury is heated from 25°C to 155°C, and absorbs 455 joules of heat in the process. Calculate the specific heat capacity of mercury.

   $$C = \frac{Q}{m(T_f-T_i)} = \frac{455 \, J}{(25g)(155-25)} = \text{0.14 J/g°C}$$

Physical Science If8767 Heat Calculations

Xiaolong Qi

Physical Science If8767 Heat Calculations:

Heat, Thermodynamics and Radiation Alauddin Khan,2021-02-01 Document from the year 2020 in the subject Physics Thermodynamics grade 4 00 language English abstract The book consists of thirteen chapters to fulfill requirements of different kind of readers This volume takes into account the study of Thermometry Kinetic theory of gases the equation of state The change of state Transmission of heat First law of Thermodynamics Thermodynamic functions Second law of Thermodynamics Third law of Thermodynamics Maxwell s equation Clausius Clapeyron equation and Radiation Laws The volume contains illustrative examples of both the ideas and the methods The book is intended as a text book on Heat Thermodynamics and Radiation for undergraduate levels and also as a reference book for anyone who is interested in this field of enquiry The book is comprehensive enough to cover all the topics that are usually taught to upper undergraduate students of Physics Chemistry and Engineering This book will be useful to students and teachers in different universities around the world Teaching Heat Transfer and Heat Exchange Brian Melvin Evenson,2004 **Worked Problems in Heat, Thermodynamics, and Kinetic Theory for Physics Students** L. Pincherle,1966 Worked Problems in Heat Thermodynamics and Kinetic Theory for Physics Students is a complementary to textbooks in physics This book is a collection of exercise problems that have been part of tutorial classes in heat and thermodynamics at the University of London This collection of exercise problems with answers that are fully worked out deals with various topics This book poses problems covering the definition of temperature such as calculating the assigned value of the temperature of boiling water under specific conditions This text also gives example of problems dealing with the fir The New Heat Theorem Walther Nernst,1969 **An Introduction to Heat Transfer** A. J. Ede,2000 **The Heat Equation** D. V. Widder,1976-01-22 The Heat Equation Heat-transfer Calculations by Finite Differences George Merrick Dusinberre,1961 Calculations in Heat, Light and Sound ... S. M. Niven,1964 Heat and Thermodynamics Mark Waldo Zemansky,1968 Written for general physics courses that emphasize temperature dependent phenomena this text deals with large scale thermal phenomena and then proceeds to small scale less accessible phenomena Examples of calculations are presented after important formulas are derived and actual thermodynamic experiments are explained in detail Physics Heat Gordon Ball Wilkes,1926 *The Theory of Heat* Thomas Preston,1904 **The Analytical Theory of Heat** Joseph Fourier,2007-10-01 In this pioneering work of mathematics Joseph Fourier shows how the conduction of heat in solid bodies can be analyzed in terms of an infinite mathematical series Known as the Fourier Series this was the first correct theory on heat diffusion and continues to be used in present day analysis For anyone interested in the theory of heat or in the mathematical tools developed by Fourier this classic work remains indispensable Born the son of a French tailor JOSEPH FOURIER 1768 1830 was a mathematician Egyptologist and politician whose strong influence on mathematical physics continues to this day His other works include Description of Egypt and Analysis of Determinate Equations **Analysis of Heat Equations on Domains. (LMS-31)**

El-Maati Ouhabaz,2004-10-31 This is the first comprehensive reference published on heat equations associated with non self adjoint uniformly elliptic operators The author provides introductory materials for those unfamiliar with the underlying mathematics and background needed to understand the properties of heat equations He then treats Lp properties of solutions to a wide class of heat equations that have been developed over the last fifteen years These primarily concern the interplay of heat equations in functional analysis spectral theory and mathematical physics This book addresses new developments and applications of Gaussian upper bounds to spectral theory In particular it shows how such bounds can be used in order to prove Lp estimates for heat Schr dinger and wave type equations A significant part of the results have been proved during the last decade The book will appeal to researchers in applied mathematics and functional analysis and to graduate students who require an introductory text to sesquilinear form techniques semigroups generated by second order elliptic operators in divergence form heat kernel bounds and their applications It will also be of value to mathematical physicists The author supplies readers with several references for the few standard results that are stated without proofs

Heat and Thermodynamics Michael Sprackling,1993 This undergraduate text presents the core topics in thermal physics using the problem based learning approach The book has combined the aim of promoting understanding through problem solving and by putting many of the problems in traditional examination form providing exam preparation

Thermal Measurements and Inverse Techniques Helcio R.B. Orlande,Olivier Fudym,Denis Maillet,Renato M. Cotta,2011-05-24 With its uncommon presentation of instructional material regarding mathematical modeling measurements and solution of inverse problems Thermal Measurements and Inverse Techniques is a one stop reference for those dealing with various aspects of heat transfer Progress in mathematical modeling of complex industrial and environmental systems has e *Mathematical Principles of Heat Transfer* K. N. Shukla,2005 This book presents an investigative account of Mathematical Principles of Heat Transfer It is concerned with three aspects of heat transfer analysis theoretical development of conservation equations analytical and numerical techniques of the solution and the physical processes involved in the three basic modes of heat transfer namely conduction convection and radiation A concept of mathematical modeling is developed through the use of differential equations In doing so the well posed boundary value problems are constructed and the solutions are attempted **Formulas and tables for heating, German formulas and tables** John Henry Kinealy,1899

Worked Problems in Heat, Thermodynamics and Kinetic Theory L. Pincherle,1966-10 The New Heat Theorem W Nerst,1984-06-01 The New Heat Theorem Walther Nernst,1969

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