

Answers

Q = mcΔT, where **Q** = heat energy, **m** = mass, and **ΔT** = change in temp.
Remember, $ΔT = (T_{final} - T_{initial})$. Show all work 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.

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

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?

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

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.

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

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.

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

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.

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



Heat Calculations Physical Science If8767

Joseph Fourier

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Heat Conduction Liqui Wang,Xuesheng Zhou,Xiaohao Wei,2007-12-20 Many phenomena in social natural and engineering fields are governed by wave potential parabolic heat conduction hyperbolic heat conduction and dual phase lagging heat conduction equations This monograph examines these equations their solution structures methods of finding their solutions under various supplementary conditions as well as the physical implication and applications of their solutions

Handbook of Numerical Heat Transfer W. J. Minkowycz,1988-03-28 Presents a comprehensive accessible and readily usable reference to the necessary formulations numerical schemes and innovative solution techniques for solving problems of heat and mass transfer and related fluid flows Grouped by major sets of methods and functions the text describes new or improved as well as standard procedures This collection of contributions from leading figures in the field covers parabolic systems hyperbolic systems integral and integro differential systems Monte Carlo and perturbation methods inverse problems and more

An Introduction to Heat Transfer A. J. Ede,2000 **Calculations in Heat, Light and Sound ...**

S. M. Niven,1964 *Heat-transfer Calculations by Finite Differences* George Merrick Dusinberre,1961 **Heat and Thermodynamics** Mark Waldo Zemansky,Richard H. Dittman,1997 This respected text deals with large scale easily known thermal phenomena and then proceeds to small scale less accessible phenomena The wide range of mathematics used in Dittman and Zemansky's text simultaneously challenges students who have completed a course in impartial differential calculus without alienating those students who have only taken a calculus based general physics course Examples of calculations are presented shortly after important formulas are derived Students see the solutions of problems related to the formulas Actual thermodynamic experiments are explained in detail The student sees the applicability of abstract thermodynamic concepts and formulas to real situations

The Theory of Heat Thomas Preston,1904 *Analysis of Heat Equations on Domains. (LMS-31)* El-Maati Ouhabaz,2009-01-10 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 L^p 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 L^p estimates for heat Schrödinger 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 **New Calculations of the Specific Heat, Enthalpy and Entropy of Air** E. Justi,1937 **The New Heat Theorem** Walther Nernst,1926 The Analytical Theory of Heat (Unabridged) Joseph Fourier,2007-03-01 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 Heat Energy Calculation ,2006

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 Analysis of Heat Equations on Domains El Maati Ouhabaz,2005 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 **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 The One-Dimensional Heat Equation John Rozier Cannon,1984-12-28 This is a version of Gevrey s classical treatise on the heat equations Included in this volume are discussions of initial and or boundary value problems numerical methods free boundary problems and parameter determination problems The material is presented as a monograph and or information source book After the first six chapters of standard classical material each chapter is written as a self contained unit except for an

occasional reference to elementary definitions theorems and lemmas in previous chapters **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 **Heat Energy Calculation** ,2006 *Physics Heat* Gordon Ball Wilkes,1926

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