



## GENERAL PHYSICS FORMULA CALCULATIONS

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### ABSTRACT

*In this paper, the calculation of general physics formulas is crucial in mechanics, thermodynamics, electricity and magnetism, quantum mechanics, optics and waves, and their practical applications are considered infinite.*

### Introduction

General physics formulas are necessary for solving problems in physics. These formulas are used to derive numerical values for quantitative and qualitative measures in physics. Physics formulas are mathematical formulas that stem from theory and experimental data. They use various units of measurement, such as meters, seconds, and kilograms, to calculate different physical properties.

Physics is a fascinating and complex field of science that explores the principles, properties and behaviors of the universe. It can be an overwhelming subject, especially for beginners who feel burdened or deterred by the numerous formulas required for calculations in various areas of physics. However, the application of these formulas is crucial in solving everyday problems and advancing technology and science. This essay delves into the importance of general physics formula calculations in physics principles, mechanics, thermodynamics, electricity and magnetism, quantum mechanics, optics, and waves, and its role in advancing scientific discoveries. The study of physics is based on reading and interpreting data and measurements obtained through experimentation and observation. One of the fundamental purposes of formulas in physics is to relate the physical quantities obtained through measurement to others that may not be directly measurable. These formulas can be used to determine unknown physical quantities in predictions, explanations, and generalized statements about the world. A significant area of general physics formula is mechanics, which deals with the motions and forces acting on objects in a specific environment. For instance, Newton's laws of motion that states that an object in motion will remain in motion unless acted upon by a force; the force, mass, and acceleration formula that states that force equals mass times acceleration; and energy conservation laws that state that energy cannot be created or destroyed but can be transferred between the object and its environment. These are just a few of the significant mechanics formulas required for calculations in everyday life.



Another essential branch of physics is thermodynamics, which is concerned with energy and heat transfer and transformation. One of the significant thermodynamics formulas is the first law of thermodynamics, which states that the change in the internal energy of a system is equal to the heat added to the system minus the work done by the system. The second law of thermodynamics, which states that the entropy of an isolated system will always increase over time, is another crucial formula required for calculations in physics. Electricity and magnetism is one of the most practical applications of the basic principles of physics. This area of physics concerns the behavior of electric charges and the forces they produce. The electric field generated by a charged particle, the relationship between electric potential, electric force, and distance, are some of the formulas that aid calculations. The formulas for magnetic force, flux, and fields are also crucial in electricity and magnetism calculations. Electrical circuits depend on calculations made with Ohm's law that governs the relationship between current, voltage, and resistance. Electrical capacitance, energy, and other electrical properties can also be determined using specific formulas.

Quantum mechanics is a branch of physics concerned with the behavior and interrelationships of subatomic particles. It is the foundation for our understanding of atoms and subatomic particles. The formulas required for calculations in this area of physics include the Schrodinger equation, which determines the probability of finding a particle in a particular position or state, and the Heisenberg uncertainty principle that describes the relationship between the position and momentum of a particle. The fundamental principles of quantum mechanics relate to calculations in nuclear physics, astrophysics, and particle physics, among others. Optics involves the study of light and how it interacts with matter. The formulas used in optics to calculate the parameters involved in the behavior of light waves include the wave equation, Snell's law, and the mirror equation. The fundamental formula of optics is the wave equation, which describes the behavior of light and its interaction with different mediums. Snell's law describes the refraction of light as it moves from one medium to another. The mirror equation determines the image's size and position in mirrors.

Lastly, waves are a fundamental aspect of physics, and their principles are applied in many areas of physics. Waves can be transverse, longitudinal, or a combination of both. Among the formulas used to calculate different aspects of waves include the wave equation, the frequency, and wavelength formula, the energy and frequency formula, and the velocity formula, amongst others. These formulas are essential in showing the relationship between different wave parameters for waves in various mediums. In conclusion, physics can be a challenging subject, and it often requires prerequisite knowledge in various mathematics areas, including calculus, trigonometry, and other essential topics. However, general physics formula calculations are fundamental to advancing scientific discoveries, technology, and everyday life applications. General physics formula calculations are crucial in mechanics, thermodynamics, electricity and magnetism, quantum mechanics, optics, and waves, and their practical applications are endless.

**Mechanics:** Mechanics is a branch of physics that deals with the study of motion and force. It utilizes formulas like Newton's second law,  $F=ma$ , to describe the acceleration of a body when subjected to a force. The formula states that the acceleration of a body is directly proportional to the external force applied to it and inversely proportional to its mass. It means



that the larger the force applied, the greater the acceleration and vice versa. Other formulas used in mechanics include Torque = force x lever arm, Work = force x distance moved in the direction of force, and Power = work/time. Thermodynamics: Thermodynamics is a branch of physics that deals with the relationship between heat, work, and energy. It utilizes formulas such as the First Law of Thermodynamics, which states that the total energy of a system is constant, and the Second Law of Thermodynamics, which states that the total entropy of a system increases with time. Other formulas used in thermodynamics include the specific heat capacity formula,  $C_p = Q/m\Delta T$ , which calculates the amount of heat required to raise the temperature of a substance, and the Ideal Gas Law,  $PV = nRT$ , which describes the behavior of gases.

Electricity and Magnetism: Electricity and magnetism are branches of physics that deal with the study of electric and magnetic fields. They utilize formulas such as Ohm's Law,  $V = IR$ , to describe the relationship between voltage, current, and resistance in circuits. Other formulas include Coulomb's Law,  $F = kq_1q_2/r^2$ , which calculates the force of attraction or repulsion between two charged objects, and the Biot-Savart Law,  $B = k(I \times r)/r^2$ , which calculates the magnetic field produced by a current-carrying wire.

Optics: Optics deals with the study of light and its interaction with matter. Optics formulas include Snell's Law,  $n_1\sin\theta_1 = n_2\sin\theta_2$ , which describes how light is refracted when it travels from one medium to another, and the Lens Formula,  $1/f = 1/d_o + 1/d_i$ , which calculates the focal length of a lens. Other formulas in optics include the Magnification Formula,  $M = h_i/h_o = -d_i/d_o$ , which calculates the magnification produced by a lens or mirror, and the intensity of light formula,  $I = P/A$ , which describes the amount of light passing through a surface.

Atomic and Nuclear Physics: Atomic and nuclear physics deals with the study of atoms and their nuclei. It utilizes formulas such as the Rydberg Formula,  $1/\lambda = R(1/n_1^2 - 1/n_2^2)$ , which calculates the wavelength of spectral lines in atomic spectra. Other formulas include the radioactive decay formula,  $N = N_0e^{-\lambda t}$ , which describes the decay of a radioactive substance over time, and the Half-Life Equation,  $t_{1/2} = \ln(2)/\lambda$ , which calculates the time required for half of a radioactive substance to decay.

Quantum Mechanics: Quantum Mechanics deals with the study of the behavior of particles at the atomic and subatomic level. It utilizes formulas such as the Schrödinger Equation, which describes the behavior of quantum systems. Other formulas include the Uncertainty Principle,  $\Delta x \Delta p \geq h/4\pi$ , which describes the uncertainty in the position and momentum of a particle, and the Quantum Numbers, which describe the energy levels and other properties of an atom.

Conclusion: In conclusion, General Physics Formula Calculations is an essential aspect of physics that enables scientists to describe and predict the behavior of physical systems. The formulas listed in this essay are just a few examples of the many formulas used in physics. All formulas utilize various units of measurement, and they are used to calculate different physical properties. Understanding these formulas and their applications in physics calculations is crucial for students aspiring to study physics at the graduate level. The more we use these formulas, the more we can help advance our understanding of.



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