

The book was found

Physics (Quick Study Academic)

BarCharts, Inc. **WORLD'S #1 ACADEMIC OUTLINE** **Copyright Material**

PHYSICS

WHAT IS PHYSICS ALL ABOUT?

Physics studies the natural phenomena that occur in our universe. A description of a natural phenomenon uses many specific terms, definitions and mathematical equations.

Solving Problems in Physics

In physics, we use the **M** code (International System) for data and calculations.

Basic Quantities **Symbol** **Unit**

- Length s, x Meter m
- Mass m, M Kilogram kg
- Temperature T Kelvin K
- Time t Second s
- Electric Current I Ampere A (C/s)

Our physical quantities are derived from these basic units. Problem derive factors or multiples of units, many variable symbols are Greek letters.

Math Skills Many physical concepts are only understood with the use of algebra, statistics, trigonometry and calculus.

CLASSICAL MECHANICS

A. Classical or Newtonian Mechanics

1. Body is given by an equation of motion with position, velocity and acceleration as variables, mass is the measure of the amount of matter, the standard unit for mass is kg. I.e. $m = 10 \text{ kg}$.

2. Newton's 1st Law: Every object in a state of uniform motion or rest will remain in that state unless an external force acts upon it.

3. Motion along a straight line is called **rectilinear**, the equation of motion describes the position of the particle and velocity for elapsed time, t .

a. **Velocity** (v): The rate of change of the displacement with time ($v = \frac{\Delta x}{\Delta t} = \frac{dx}{dt} = \frac{dx}{dt}$).

b. **Acceleration** (a): The rate of change of the velocity with time ($a = \frac{\Delta v}{\Delta t} = \frac{dv}{dt} = \frac{dv}{dt}$).

c. Δ & Δt are vectors, with magnitude and direction.

d. Speed is the absolute value of the velocity, scalar with the same units as velocity.

2. **Equations of Motion for One Dimension (1-D)**

Equations of motion describe the future position (x) and velocity (v) of a body in terms of the initial velocity (v_0), position (x_0) and acceleration (a).

a. For constant acceleration, the position is related to time by the following: $x = v_0 t + \frac{1}{2} a t^2$.

b. For constant acceleration, the velocity (v) is given by the following: $v = v_0 + a t$.

c. If the acceleration is a function of time, the equation must be solved using $a = \frac{dv}{dt}$.

B. Motion in Two Dimensions (2-D)

1. For a body moving along a straight line, define x and y as equations of motion: $x = x_0 + v_{0x} t$, $y = y_0 + v_{0y} t$.

2. For a rotating body, use polar coordinates, an angle θ , and r , a radial distance from the rotational center.

C. Motion in Three Dimensions (3-D)

1. **Cartesian System**: Equations of motion with x, y and z components.

2. **Spherical Coordinates**: Equations of motion based on polar angles θ and ϕ and the radial distance from the origin.

D. Newton's Laws of Motion

Newton's Laws are the core principles for describing the motion of classical objects in response to forces. The SI unit of force is the Newton, N (1 kg m/s²), the CGS unit is the dyne, $1 \text{ dyne} = 1 \text{ g cm/s}^2$.

E. Newton's 3rd Law

Newton's 3rd Law: For every action there is an equal and opposite reaction.

F. Types of Forces

1. A body force acts on the entire body, with the force acting at the center of mass.

a. A gravitational force, F_g , pulls an object toward the center of the Earth, $F_g = mg$.

b. Weight = F_g gravitational force.

c. Mass is a measure of the quantity of material, independent of g and other forces.

2. Surface forces act on the body's surface.

a. Friction, F_f , is proportional to the force normal to the surface of the body in contact with a surface, $F_f = \mu_s \cdot F_N$.

b. Static friction resists the movement of a body.

c. Dynamic friction allows the motion of a body.

For an object on a horizontal plane, $F_f = \mu_s \cdot F_N$ if $F_f < \mu_s \cdot F_N$ if $F_f = \mu_s \cdot F_N$.

G. Circular Motion

1. Motion along a circular path uses polar coordinates, (r, θ) .

Key Variables

- Radius**: The distance from the rotation center (center of mass).
- Radian**: The angle between r and the (x) axis.
- Radians/second**: The angular velocity.
- Radians/second²**: The angular acceleration.
- Velocity**: The circular motion rate, $v = \theta \cdot r$ (in rad/s).

1. **Tangential acceleration & velocity**: $v_t = r \omega$, $a_t = r \alpha$, v and a along the path of the motion are.

2. **Centripetal acceleration**: $a_c = \frac{v^2}{r}$ is directed toward the rotational center.

a. The centripetal force keeps the body in circular motion with a tangential acceleration and velocity.

Copyrighted Material

K. Kinetic Energy & Work

1. **Kinetic energy**, K : Kinetic energy is the energy of motion, mass, m and velocity, v : $K = \frac{1}{2} m v^2$.

The SI energy unit is the Joule (J): $1 \text{ J} = 1 \text{ kg m}^2 \text{ s}^{-2}$.

2. **Work**: Work is a process of motion, a product of force and displacement, $F \cdot d \cos(\theta)$: $W = F \cdot d \cos(\theta)$ if $0 < \theta < 90^\circ$.

For a constant force, work is the scalar product of the force, mass, force, F , and path, d : $W = F \cdot d \cos(0^\circ) = F \cdot d$.

L. Power & Energy Conservation

1. The power (P) is energy expended per unit time: $P = \Delta W/t = \Delta K/t$.

Work = $\int P dt$.

The SI unit for power is the Watt (W): $1 \text{ W} = 1 \text{ Joule/second} = 1 \text{ J/s}$.

Work for a constant output of power: $W = P \cdot t$.

M. Potential Energy & Energy Conservation

1. The total energy of a body, E , is the sum of kinetic, K , & potential energy, P : $E = K + P$.

2. Potential energy arises from the interaction with a potential force or external force.

a. Gravitational potential energy: $U_g = mgh$, the form of U_g depends on the force generating the potential.

b. Elastic potential: $U_e = \frac{1}{2} k x^2$.

c. When no other forces acting on the system, T , is constant and the system is called **conservative**.

N. Collision & Linear Momentum

1. **Types of Collisions**

a. Elastic collision: $E = E'$.

b. Inelastic collision: $E \neq E'$.

2. **Relativistic Motion & Frames of Reference**

a. **Relative Motion**: A body moves with velocity v in frame S in frame S' , the velocity is v' , if v'_x is the velocity in S' , v'_y is the velocity in S' relative to S , therefore $v'_x = v_x + v$.

b. **Relativistic**: $v = \frac{c}{\sqrt{1 - v^2/c^2}}$.

3. **Collisions**

a. **Conservative**: $K_i + U_i = K_f + U_f$.

b. **Inelastic**: $K_i + U_i = K_f + U_f$.

4. **Impulse** is a force acting over time: $\text{Impulse} = F \cdot t = \int F(t) dt$.

Impulse is also the momentum change: $\text{Imp} = \Delta p$.

PDF



DOWNLOAD EBOOK

Synopsis

Reference and outline to concepts in physics.

Book Information

Series: Quickstudy: Academic

Pamphlet: 6 pages

Publisher: QuickStudy; Lam Crds edition (January 1, 2007)

Language: English

ISBN-10: 1423203100

ISBN-13: 978-1423203100

Product Dimensions: 8.5 x 11 x 0.1 inches

Shipping Weight: 1.6 ounces (View shipping rates and policies)

Average Customer Review: 4.3 out of 5 starsÂ See all reviewsÂ (31 customer reviews)

Best Sellers Rank: #27,762 in Books (See Top 100 in Books) #7 inÂ Books > Science & Math > Physics > Dynamics > Thermodynamics #18 inÂ Books > Science & Math > Reference #69 inÂ Books > Textbooks > Science & Mathematics > Physics

Customer Reviews

This chart has errors in some of the equations. Equations listed for magnetic force (such as $F = qv \times B$) that should have a cross product have a dot product instead. I was disappointed to find this because it means this product is not properly refined and therefore useless to me as a student. I really like it otherwise, as it covers all the stuff seen in standard sophomore level physics classes.

BarCharts are a great little reference. I would not recommend them as a study aid, but as a quick reference, they are great! I have used them for Chem, Physics, Electronics and Math. They are great for what they are.

Mine may be a different edition because there is a cross product in the magnetic force formula, but I am missing a dot in the definition of magnetic flux and the magnetic field of a long conducting wire (for the Biot-Savart Law sample) is incorrect. It shows division by 4π when it should be 2π . I would recommend students using these guides double check the formulas with their textbooks the first time they use them.

trial versionThis is an excellent reference and self-study guide. And for the price, it's an absolute steal. If you've been wanting a concise, yet relatively complete Physics ebook, and one that is well-written and easy to follow, I highly suggest Physics Formulas and Tables by MobileReference.

I brought this to aid me in my Physics class. This pamphlet has all the formulas I will need for an intro class. It is very is to read and not hard to understand.

These items are wonderful to tuck in a textbook or in a three ring binder for a quick handy reference guide. The information is commonly available, but this is an ideal study aid.

I love these. My kids use them for AP classes. It is really helpful. This is for class next year but the ones i have gotten in the past have been very beneficial.

Good tool. A bit of an overkill for me. Not by any fault to the study guide, it was simply far more than I needed for a calculus based first year physics class.

[Download to continue reading...](#)

Physics (Quick Study Academic) Physics Equations & Answers (Quick Study Academic) Nclex-Rn Study Guide (Quick Study Academic) The Solid State: An Introduction to the Physics of Crystals for Students of Physics, Materials Science, and Engineering (Oxford Physics Series) Ekg / Ecgs (Quick Study: Academic) Endocrine System (Quick Study Academic) Circulatory System Advanced (Quick Study: Academic) Medical Coding: Icd-10-Pcs (Quick Study Academic) The Foot (Quick Study Academic) Anatomy Test (Quick Study Guides-Academic) Spanish Grammar (Quick Study: Academic) Nursing Pharmacology (Quick Study: Academic) Nursing Math (Quick Study: Academic) Spanish Conversation (Quick Study: Academic) English Grammar & Punctuation (Quick Study Academic) Dsm-5 Overview (Quick Study Academic) Apa/Mla Guidelines (Quick Study: Academic) 1001 Words For Success (Quick Study: Academic) Psychology: Developmental (Life Span) (Quick Study: Academic) Organic Chemistry Fundamentals (Quick Study Academic)

[Dmca](#)