

Autograph

version 3

and COLLEGE PHYSICS

Autograph is spectacular dynamic software from the UK that allows teachers to visualise many of the mathematical topics that occur in the various college level PHYSICS courses.

<p>DIFFERENTIAL EQUATIONS</p> <p>Free Fall: $mg - kv^n = m\dot{v}$</p>	<p>WAVES and TRIG</p> <p>Two sin waves: $y = \sin 20x + \sin(kx)$ Envelope: $y = \pm 2\cos(10x - kx/2)$</p>
<p>2D and 3D VECTORS</p>	<p>PROJECTILES and VECTORS</p> <p>Projectile: $x = ut, y = h + vt - \frac{1}{2}gt^2$</p>
<p>AREAS AND VOLUMES</p> <p>Volume: $33.96\pi \text{ cm}^3$ Area: 10.90 cm^2</p> <p>Harry's Goblet: $y = 0.00943x^4 - 0.223x^3 + 1.63x^2 - 3.68x + 2.60$</p>	<p>PARAMETRIC EQUATIONS</p> <p>Projectile: $x = (u\cos\phi)t, y = (u\sin\phi)t - \frac{1}{2}gt^2$ Family: $\phi = 0, 10, 20, 30, 45$ Envelope: $y = u^2/(2g) - gx^2/(2u^2)$</p>



THE LEARNING TEAM

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USA 2-YEAR COLLEGE PHYSICS COURSES

with references to AUTOGRAPH



AUTOGRAPH PAGE

INTRODUCTION TO PHYSICS

Motion; Forces and Momentum; Work, Energy Storage, and Transfer; Physical, Electrical, and Magnetic Properties of Matter; Atomic and Nuclear Processes



2D

BASIC PHYSICS

I. Physical Quantities and Units

Introduction ; Standards and Units; Unit Consistency and Conversions; Precision and Significant Figures; Estimates and Orders of Magnitudes

II. Vectors

Representation of Vectors; Properties of Vectors; Vector Components; Vector Addition/Subtraction



2D,

3D

III. Kinematics - One Dimension

Displacement; Average and Instantaneous Velocity; Average and Instantaneous Acceleration; Motion at Constant Velocity; Motion at Constant Acceleration; Freely Falling Bodies



2D

IV. Newton's Laws of Motion

Force; Units; Newton's First Law of Motion; **Newton's Second Law of Motion**; Newton's Third Law of Motion ; Friction



2D

V. Application of Newton's Second Law of Motion

Free Body Diagrams; **Application - Dynamics**; Application – Statics; First Condition of Equilibrium; General Application



2D

2-Year COLLEGE PHYSICS

AUTOGRAPH PAGE

VI. Newton's Law of Universal Gravitation

Mass and Weight; Newton's Law of Universal Gravitation; Applications

VII. Motion in a Plane

Components of Velocity; Components of Acceleration; Projectile Motion; Circular Motion; Centripetal Force and Acceleration; Motion of a Satellite



VIII. Work and Energy

Work; Kinetic Energy; Work and Kinetic Energy; Gravitational Potential Energy; Elastic Potential Energy; Conservation of Energy; Conservation and Dissipative Forces; Power

IX. Impulse and Momentum

Momentum; Impulse; Conservation of Momentum; Collision; Inelastic Collision; Elastic Collisions; Recoil

X. Equilibrium of a Rigid Body

Center of Mass; Torque; Second Condition for Equilibrium; Center of Gravity; Applications

GENERAL PHYSICS I

Linear Motion; Non-linear Motion; Forces and Momentum; Work, Energy Storage and Transfer; Properties of Matter



GENERAL PHYSICS II

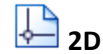
Electrical and Magnetic Properties of Matter; Fields and Forces; DC and AC Circuits; Electromagnetism; Elements of Modern Physics

2-Year COLLEGE PHYSICS

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UNIVERSITY PHYSICS I

Unit, Physical Quantities, and **Vectors**; **Linear and Rotational Motion**, Force, Energy and Momentum; Equilibrium of Particles and Rigid Bodies and Elasticity; Gravity; Fluids; **Harmonic Motion**; Mechanical Waves and Vibrations in Matter; Thermodynamics



UNIVERSITY PHYSICS II

Electricity; Magnetism; Basic Circuits; Properties of Electromagnetic Waves; Optics; Modern Physics

UNIVERSITY PHYSICS I: MECHANICS

Linear Motion; **Non-Linear Motion**; Forces and Momentum; Work, Energy Storage and Transfer; **Harmonic and Wave Motion**; Properties of Matter



UNIVERSITY PHYSICS II: ELECTRICITY AND MAGNETISM

Electric and Magnetic Properties of Matter; Fields and Forces; DC and AC Circuits; Electromagnetism

**UNIVERSITY PHYSICS III:
THERMODYNAMICS, OPTICS, AND WAVE PHENOMENA**

Heat and Thermodynamics; Optics; Light Waves; Modern Physics

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