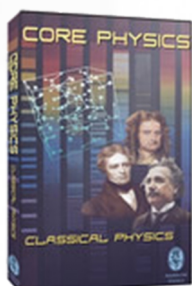


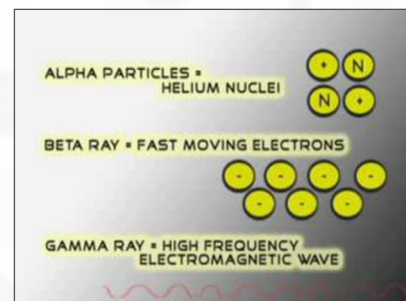
PHYSICAL SCIENCES DVD

Cat.# AB-11D - CORE PHYSICS: CLASSICAL PHYSICS

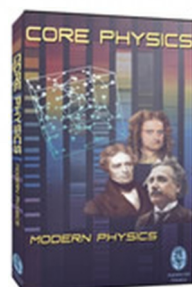


Physics is the study of the elemental constituents of the universe. It deals with matter energy, forces, space and time. In the long history of physics, a series of discoveries and laws laid the foundation for how the universe works. In Core Physics these discoveries and laws are laid out in chronological order, each naturally building on the former. This program covers classical physics... the period which led to the Industrial Revolution and modern technology.

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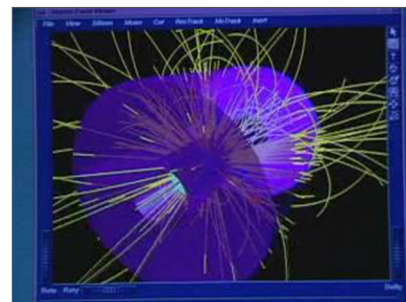


Cat.# AB-12D - CORE PHYSICS: MODERN PHYSICS



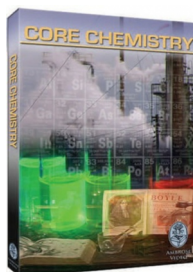
Physics is the study of the elemental constituents of the universe. It deals with matter energy, forces, space and time. In the long history of physics, a series of discoveries and laws laid the foundation for how the universe works. In Core Physics these discoveries and laws are laid out in chronological order, each naturally building on the former. This program covers modern physics ... The period of time which brought us new paradigms of how the universe works and our place in it.

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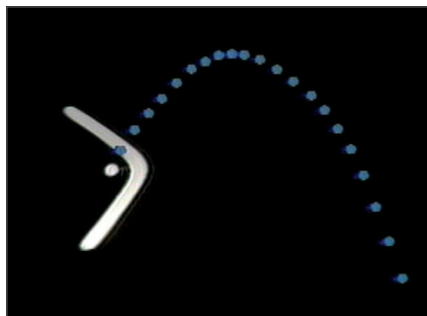
Cat.# AB-10D - CORE CHEMISTRY



Future problems of energy, food, medicines and materials are the problems of chemistry. No science is more at the core of every technology that supports the seven billion people living on the planet today than chemistry. Chemistry is at the base of the foods, medicines, fuels and materials that are the hallmarks of modern life.

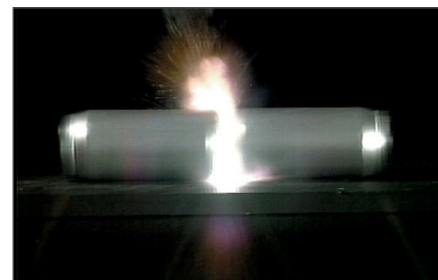
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A standard periodic table of elements, showing the arrangement of chemical elements. The elements are organized into groups and periods, with their atomic numbers and symbols visible.



Contents of Part 1: Uniform and Accelerated Motion: Position-Time Observations (Stroboscopic Photography), **Gravitational Acceleration:** Determination of g (Stroboscopic Photography), **Projectile Motion:** Simultaneous Fall (Stroboscopic Photography), **Projectile Motion:** Monkey and Hunter, **Projectile Motion:** Trajectory of a Projectile (Stroboscopic Photography), **Circular Motion:** Direction of Centripetal Force, **Circular Motion:** Centrifugal Effects on Rotating Sphere, **Circular Motion:** Motion in a Vertical Plane, **Conservation of Energy:** Minimum Critical Velocity on a Vertical Loop, **Work and Conservation of Energy:** Energy Transformations on a Double Incline.

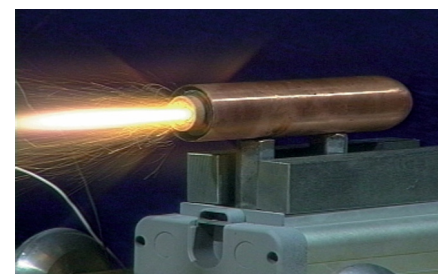
Contents of Part 2: Newton's 1st Law: Rest Inertia of Massive Ball, **Newton's 2nd Law:** Effects of a Varied Net Force on a Body's Motion, **Newton's 3rd Law:** Reaction Cart/Projected Ball Bearings, **Terminal Velocity:** Air Resistance Acting on a Free-Falling Body (Stroboscopic Photography), **Motion of Centre of Mass:** System with Internally Moving Components, **Motion of Centre of Mass:** Projected Boomerang & Tennis Racket (Stroboscopic Photography), **Conservation of Momentum:** Determination of a Bullet's Velocity, **Conservation of Momentum:** Internal Explosion, **Conservation of Angular Momentum:** System of Rotating Spheres, **Free-Fall Paradox:** Falling Chimney, **Centre of Percussion:** Impulsive Forces Delivered to a Baseball Bat.



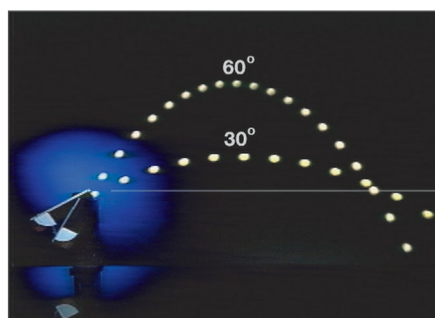
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Contents of Part 3: Graphical Analysis of Motion: Car Accelerating on Highway (Computer Animation), **Vector Addition:** Object Travelling on Moving Surface, **Velocity and Acceleration Vectors:** Direction of v and a during Acceleration and Deceleration, **Newton's 1st Law:** Rest Inertia of Bursting Water Balloon; Shattering Flask; and Concrete Block Receiving Sharp Blow (High Speed Film), **Newton's 1st Law:** Motion Inertia of Steel Wedge Splitting Board; Ketchup Cart (High Speed Film), **Frame of Reference:** A Galactic Observer/Relative Motion (Computer Animation), **Frame of Reference:** Inertial and Non-inertial Reference Frames.



Contents of Part 4: Fundamental Forces: Gravitational, Electromagnetic, Strong, and Weak Forces *Computer Animation*, **Mass and Weight:** Weightlessness during Free-fall, **Newton's 2nd Law:** Force and Acceleration of a Rocket Powered Car, **Newton's 3rd Law:** Action-Reaction Forces of a Liquid Nitrogen Cannon, **Newton's 2nd and 3rd Laws:** Helicopter Dynamics, **Force Components:** Perpendicular Force Applied to Tension Cable, **Newton's Law of Universal Gravitation:** Cavendish Experiment *Time Lapse Film*.



Contents of Part 5: Projectile Motion: Ballistics Cart/Horizontal Components of Motion, **Projectile Motion:** Trajectory and Range Analysis, **Circular Motion:** Centripetal Force and Tangential Velocity, **Circular Motion:** Unique Behavior of a Rotating Chain, **Impulse and Momentum:** Egg Impacting Rigid Surface and Water Column, High Speed Film, **Characteristics of Collisions:** Elastic and Inelastic Collisions, **Elastic Collision:** Duration and Magnitude of Impact Forces.

Contents of Part 6: Conservation of Momentum: Strobe Analysis of Two-Dimensional Collisions, **Motion of Center of Mass:** Rigid and Non-Rigid Bodies, **Work and Energy:** Work Performed by Falling Mass High Speed Film, **Work and Energy:** Quantitative Analysis of Bow & Arrow System, **Rotational Dynamics:** Behavior of a Gyroscope, **Physics**

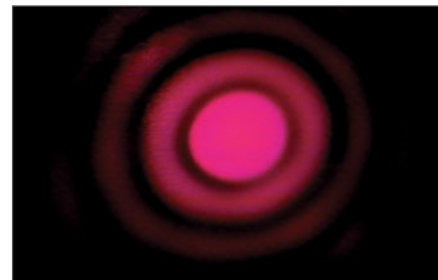
Teasers/ Predict the Outcome: A Collection of Puzzling Physical Events.

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Cat.# PCI-26D - PHYSICS DEMONSTRATIONS IN LIGHT DVD, Parts 1 and 2

Physics Demonstrations in Light is a two-part video program which presents a full range of demonstrations in the areas of geometrical optics, physical optics, and the nature of light. The program was developed in an effort to give physics teachers a comprehensive collection of video demonstrations, supplementing the instructor's live classroom demonstrations. The program was designed to meet the needs of high school physics classes as well as introductory level college physics classes.

Contents of Part 1: Propagation of Light: Determination of the Speed of Light, **Visible and Infrared Spectrum:** White Light Dispersed on a Spectrum Recorder, **Inverse Square Law:** Light Intensity at Increasing Distances, **Refraction/Total Internal Reflection:** Light Incident on a Water-Air Interface, **Refraction/Schlieren Image:** Variations in the Index of Refraction of Air, **Refraction:** Simulation of Atmospheric Refraction, **Rayleigh Scattering:** Blue Sky and Sunset Simulation, **Laser Theory:** High Power CO₂ Laser.



Contents of Part 2: Interference/Interferometer: Interference of White Light and Laser Light, **Interference/Interferometer:** Determination of the Wavelength of Light, **Diffraction and Interference:** Double-Slit Interference, **Diffraction and Interference:** Single-Slit Diffraction, **Diffraction and Interference:** Microwave Diffraction, **Thin Film Interference:** Newton's Rings/Air Wedge with Monochromatic Light, **Diffraction and Interference:** Diffraction Patterns Produced by Various Objects, **Holography:** The Making of a Hologram.

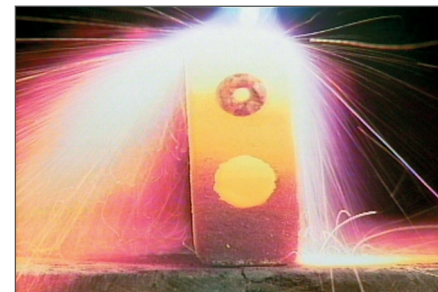
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See available bundles for these DVD titles, and prices on [Page 23](#)

Cat.# PCI-19D - PHYSICS DEMONSTRATIONS IN HEAT DVD, Parts 1, 2 and 3

Physics Demonstrations in Heat is a three-part video program which presents a full range of demonstrations in thermal properties of matter, mechanisms of heat transfer, and thermodynamics.

The program was developed in an effort to give physics teachers a comprehensive collection of video demonstrations, supplementing the instructor's live classroom demonstrations. Instructors will find the program suitable for high school as well as introductory level college Parabolic mirror focuses infrared physics classes.



Contents of Part 1: Thermal Expansion: Changing Volume of a Liquid, **Phase Change Expansion:** Exploding Ice Bomb, **Thermal Expansion:** Forces Exerted During Expansion and Contraction, **Linear Expansion:** Determination of Expansion Coefficient, **Phase Changes:** Transition from Gaseous to Liquid O₂, **Cryogenics:** Changes in Material Properties, **Cryogenics:** Organic Materials, **Specific Heat:** Determination of C_p.

Contents of Part 2: Thermal Conduction: Propagation in a Metal Rod, **Thermal Conduction:** Comparison of Heat Transfer in Two Materials, **Thermal Convection:** Induced Fluid Flow, **Thermal Convection:** Projection of Convection Currents, **Thermal Radiation:** Focused Transmission Using Parabolic Mirrors, **Thermal Radiation:** Black Body Effects, **Thermal Radiation:** Leslie's Cube, **Heat Transfer:** Boiling Inferno, **Heat Transfer Mechanisms:** A Side by Side Comparison.

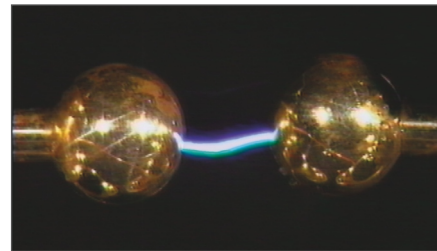


Contents of Part 3: Mechanical Equivalent of Heat: Bullet Fired into a Lead Mass, **Kinetic Model:** Temperature Effects on Gases, **Induced Phase Change:** Liquid to Solid Transition of N₂, **Cryophorous:** Cooling by Evaporation, **Induced Phase Change:** Boiling by Cooling, **Condensation:** Formation of a Cloud, **Pressure and Temperature:** Piston in a Cylinder, **Entropy:** Time Reversal/Mixing of a Dye.

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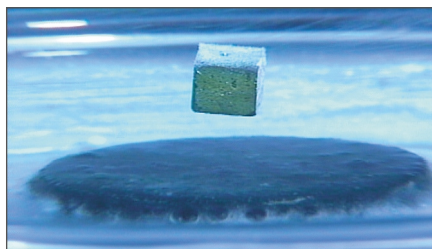
Physics Demonstrations in Electricity & Magnetism is a three-part video program which presents a full range of demonstrations in the areas of electricity and magnetism. The program was developed in an effort to give physics teachers a comprehensive collection of video demonstrations, supplementing the instructor's live classroom demonstrations.

Three-dimensional computer animation is used to augment many of the demonstrations, providing a graphical representation of the physical behavior.



Contents of Part 1: Electrostatics: Interaction of Charge, **Electrostatics:** Distribution of Charge on a Conductor, **Electrostatics:** Induction of Charge, **Isolation of Charges:** Kelvin Water Dropper, **Electrostatics:** Force Exerted between Charges, **Corona Discharge:** Detection of Electric Wind, **Momentum of an Electron:** Momentum Imparted During Collision, **Corona Discharge:** Lightning Model.

Contents of Part 2: Corona Discharge: Electronic Precipitator, **Electric Fields:** Mapping of Force Field, **Electric Fields:** Electromagnetic Shielding, **Electric Fields:** Parallel Plate Capacitor, **Electric Fields:** Energy Stored in a Capacitor, **Electrochemical Effects:** Operation of a Battery, **Temperature and Resistance:** Effect of Temperature Extremes on Conductivity, **Superconductivity:** Zero Resistance and Meissner Effect.

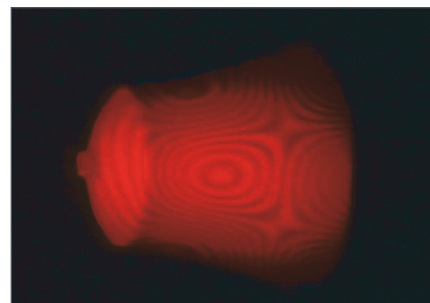


Contents of Part 3: Magnetic Fields: Mapping of Force Field, **Electricity and Magnetism:** Lenz's Law, **Electromagnetic Effects:** Force on an Electron Beam, **Electromagnetic Effects:** Forces on Current Carrying Wire, **Electromagnetic Effects:** Magnetic Forces on Moving Charge, **Electricity and Magnetism:** Induction of Current, **Induction Application:** Voltage Transformer, **Eddy Currents:** Force Acting on a Moving Conductor.

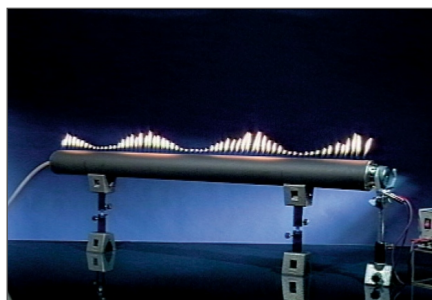
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Physics Demonstrations in Sound & Waves is a three-part video program which presents a full range of demonstrations in the areas of sound, vibrations, and wave behavior. The program was developed in an effort to give physics teachers a comprehensive collection of video demonstrations, supplementing the instructor's live classroom demonstrations. Three-dimensional computer animation is used to augment many of the demonstrations, providing a graphical representation of the physical behavior.



Contents of Part 1: Mechanical Resonance: Forced Vibrations with Single and Coupled Oscillators, **Velocity/Wavelength & Frequency/Reflected Waves:** Transverse Waves on a Coil Spring, **Change in Medium/Interference:** Transverse Waves on a Coil Spring, **Standing Waves:** Vibrational Modes on a String, **Longitudinal Waves:** Propagation/Interference of Longitudinal Waves, **Longitudinal Standing Waves:** Stroboscopic Analysis of Standing Wave Behaviour, **Waves in Two-Dimensions:** Reflection and Refraction of Waves in a Ripple Tank, **Waves in Two-Dimensions:** Interference and Diffraction of Waves in a Ripple Tank.



Contents of Part 2: Nature of Sound Waves: Sources and Propagation of Sound, **Propagation of Sound:** Direct Measurement of the Speed of Sound in Air and Metal, **Transmission of Sound Through a Medium:** Attenuation of Sound in a Vacuum, **Refraction of Sound:** Carbon Dioxide Sound Lens, **Interference of Sound:** Sound Divided into Two Paths of Differing Length, **Interference of Sound:** Beat Phenomena, **Diffraction**

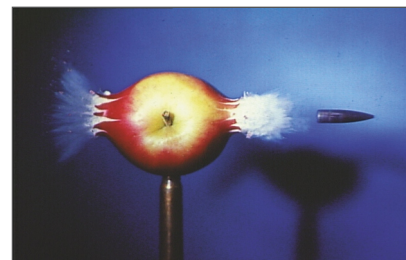
Contents of Part 3: Standing Sound Waves: Resonating Air Column with Cork Dust, **Standing Sound Waves:** Resonance with Illuminating Gas in a Flame Tube, **Standing Sound Waves in Two-Dimensions:** Illuminating Gas in a Resonating Cavity, **Resonance/Real-Time Strobe Holography:** Resonant Modes of a Vibrating Bell, **Vibrations in a Two-Dimensional Surface:** Chladni Plate, **Superposition Principle:**

Fourier Analysis & Synthesis of Complex Musical Tone, **Quality of Sound/Harmonics:** String Vibrations on a Guitar, **Frequency Spectrum of Sound:** Audible and Ultrasonic Waves.

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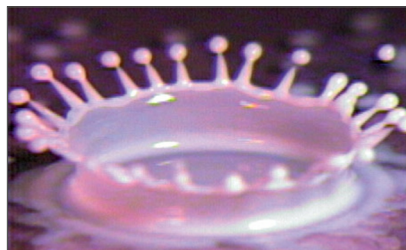
Cat.# PCI-35D - HIDDEN BY TIME: Seeing the Physical World with High-Speed Cameras

In a world of motion, many events simply happen too fast to be seen with the unaided eye. With the aid of high-speed cameras, physical events which normally go unnoticed come to life to produce extraordinary sights. High-speed images reveal the awe and wonder of the physical world and provide an intriguing introduction to the study of physics. *Hidden by Time* is a collection of numerous physical events captured with high-speed cameras for classroom study. The program is comprised of high-speed motion events as well as high-speed still images



High-Speed Motion Events (Approximately 30 Minutes)

Imaging of high-speed motion events was accomplished using a recently developed high-speed digital camera operating at 1000 and 2000 frames/sec; shutter speed of 0.04 milliseconds. Contained in the program are over 70 high-speed sequences involving impacts, collisions, and fluid behaviours.



High-Speed Still Images (50 Images)

Included in the collection of high-speed stills are over 20 classic images produced by Dr. Harold Edgerton, distinguished for his pioneering work in high-speed photography. Other high-speed still images were produced by Charles Miller, Massachusetts Institute of Technology; and Loren Winters, North Carolina School of Science and Mathematics.

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Cat.# PCI-34D - THE PHYSICS OF SPACE FLIGHT - Parts 1, 2 and 3

The Physics of Space Flight Series is a three-part video program which presents physics principles as they apply to space flight and space related events. The program's photography was provided entirely by NASA, affording a great deal of spectacular footage accompanying the physics principles being illustrated. Computer animation and the use of graphics also assist in presenting physical concepts. The program was designed for use by high school physics classes and introductory level college physics courses.



Part 1: Acceleration Machines, Launching a Space Vehicle: *Newton's Laws of Motion, Kinematics, Conservation of Energy & Momentum, Power, Aerodynamic Effects.* This program details the physics involved in launching a space vehicle. The Space Shuttle and Saturn V launches are dynamically examined in terms of the vehicle's thrust, changing weight, net force, acceleration, and velocity throughout the initial stages of ascent and injection into orbit. The dynamics of launching a rocket from the earth's surface is contrasted to the lift-off of the Lunar Module from the surface of the moon. The rocket engine principle is discussed in terms of Newton's Third Law of Motion. Newton's Second Law of Motion, expressed in terms of momentum, is used to find the magnitude of thrust produced by a single Space Shuttle main engine. Launch trajectories and the effect of the earth's rotation on launching a rocket into orbit are also explained.

Part 2: Physics in Space Orbital Motion & Re-entry: *Newton's Laws of Motion, Circular Motion, Rotational Dynamics, Heat, Conservation of Energy.* This program focuses on the physics of orbital motion and re-entry into the earth's atmosphere. The program discusses the dynamics of orbital motion and the apparent weightlessness experienced while in orbit. Kepler's 3 laws of planetary motion are applied to satellites, explaining the characteristics of both circular and elliptical orbits. Orbital motion of the Space Shuttle is studied in terms of the acting gravitational centripetal force, orbital radius, and orbital velocity. Satellite deployment from the Space Shuttle and subsequent attainment of geosynchronous orbit is also examined. The weightless environment provides a unique opportunity for motion studies in which Newton's Three Laws of Motion become particularly apparent. Heat transfer in the vacuum of space and a discussion on thermal energy concludes the program as the atmospheric re-entry of the Space Shuttle is contrasted to that of the Command Module.

Part 3: Gravity: A Broadened View: *Newton's Law of Universal Gravitation, Gravitational Acceleration, Newton's Laws of Motion, Fluid Mechanics.* This program centers on presenting a broadened perspective of gravity, with emphasis given to observing its influence in different environments. Newton's Law of Universal Gravitation is used to determine the magnitude of the earth's gravitational force at increasingly distant locations from its center; computer graphics are used to simulate pulling away from the earth with the inverse square curve graphically being developed. The microgravity environment is examined in terms of its effect on various physical properties and the unique mechanics it presents to orbiting space structures. Gravitational acceleration on the surface of the moon is contrasted to that of earth by observing experiments and events which took place during the moon walks of the Apollo Program. Finally, an examination of the Gravity Assist Principle, or "Slingshot Effect", provides an intriguing example of utilizing gravitational forces to greatly accelerate spacecraft on their journey to the outer solar system.



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