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MEDICAL & SCIENCE MEDIA

Physics & Chemistry SOFTWARE

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Cat #: MS-1

Model Chem Lab - Wins & Mac

Whether your challenge is to introduce new computer technology to your curriculum, or bring the lab experience to on-line students or a need for an alternative to dangerous, expensive or environmentally hazardous labs, then Model ChemLab is the classroom proven solution for you.

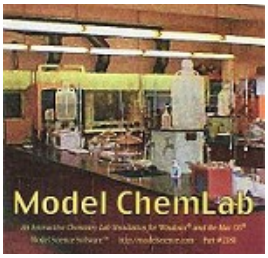
Model ChemLab originated from academic work in computer simulation and software design at McMaster University. It has continued to be developed with extensive input from educators interested in the possible application of computer simulations for classroom and distance learning.

Model ChemLab is a unique product incorporating both an interactive simulation and a lab notebook workspace with separate areas for theory, procedures and student observations. Commonly used lab equipment and procedures are used to simulate the steps involved in performing an experiment. Users step-through the actual lab procedure while interacting with animated equipment in a way that is similar to the real lab experience. ChemLab comes with a range of pre-designed lab experiments for general chemistry at the high school and college level.

Users can expand upon the original lab set using ChemLab's LabWizard development tools, thus allowing for curriculum specific lab simulation development by educators. These user designed simulations combine both text based instructions and the simulation into a single distributable file.

ChemLab Design:

- Easy to use lab interface modelled on common lab procedure
- Student lab notebook workspace area
- Real time animated interactive simulation engine
- Lab Wizard tools for easy user created lab simulations
- Support for plug-in lab simulations extensions
- Demonstration mode, allows user to capture and replay a simulation.
- Integration with RasMol molecular viewer
- Integrated Periodic Table application with quiz
- Available in English, Spanish and French



Lab equipment:

- Beakers, Erlenmeyer and Florence flasks, test tubes, graduated cylinders, burets, eye dropper, pipets, watch glasses, filtering flask with buchner funnel, Bunsen burner, hot plate / Magnetic stirrer, stirring rods, evaporation dish, calorimeter, conductivity meter, potentiometer, Spectrophotometer and others…
- Balances: centigram, electronic and high sensitivity balance
- Distillation equipment set-up: distillation flask with heating mantel, distillation head, condenser and distillation take-off

Common Lab Procedures:

- Titration, Decanting /pouring
- Heating and hot/cold water baths
- Temperature, weight, pH, conductivity, voltage and volume measurements
- Plot titration curves

Large selection of pre-defined labs simulations:

- Acid/base reactions, bond lab, cations reactions, electrochemistry, equilibrium, flame lab, fractional crystallization, fractional distillation, gravimetric analysis, kinetics, redox reactions, stoichiometry, thermal chemistry, volumetric analysis, water quality, weak acid titration and many more.

Lab Wizards (Professional Edition):

- Allow users to create customized lab simulations
- Lab Wizard steps users through process of new lab creation
- Single distributable file
- Expandable chemical database allows users to add new chemicals to *ChemLab*

Free updates from Model Science web site:

- Registered users can download updates and new Lab simulations from the Model Science web site.

Wide Range of Applications:

- Ideal for distance learning, demonstrations, lab run-throughs, pre-lab work, dangerous and environmentally hazardous, expensive, or lengthy labs.

Lab Wizards (Professional Edition):

- Allow users to create customized lab simulations
- Lab Wizard steps users through process of new lab creation
- Single distributable file
- Expandable chemical database allows users to add new chemicals to *ChemLab*

Lab Demonstration Mode:

- Allows Professional users to capture lab simulations as they perform it and save in a demo file
- Add comments and other messages to demonstration file
- Single distributable demo file
- Playback demonstration files in both Professional and Standard editions of ChemLab

Free updates from Model Science web site:

- Registered users can download updates and new Lab simulations from the Model Science web site.

Wide Range of Applications:

- Ideal for distance learning, demonstrations, lab run-throughs, pre-lab work, dangerous and environmentally hazardous, expensive, or lengthy labs.

System Requirements: ***Windows:*** Windows® 7/Vista/XP/98/ME/NT/2000 with 8MB RAM VGA or higher.
Macintosh: Mac OS X; Version 10.1.5 or greater.

Cat #: PCI-2

Exploration of Physical Sciences, Volume 1 - Wins & Mac

Exploration of Physics, the most comprehensive physics simulation software package available, brings new innovative computer curriculum tools to physics teaching. The 49 highly interactive stand-alone simulations cover a full year of introductory physics – mechanics, waves, heat, fluids, electricity & magnetism, and optics are all given extensive treatment. The software program utilizes a simulated lab approach allowing students to perform in-depth investigations. Each simulation employs its own powerful engine that accurately recreates the physical world. Experimental parameters are easily manipulated using an assortment of slider controls; physical behaviours are brought to life using animated graphics that respond to user input; and physical quantities are displayed using digital readouts, graphs, and histograms. Each simulation has a readily accessible help screen providing information on using the simulation, along with a discussion of the underlying physics principles.

The vast collection of simulations may be used in a variety of ways: (1) as an instructor lecture aid for demonstration purposes in front of the classroom, (2) for student use as a computer based lab activity. Exploration of Physics simulations can be used to introduce a physics concept, or serve nicely to reinforce and extend a lab (involving apparatus) that has already been performed. The ready-to-run simulations and highly intuitive interface allows first time users to immediately use the simulations and begin exploring with no preliminary time investment – essentially providing a ready-to-go lab experience.

Simulations Contained in Volume 1: Mechanics - Position, Velocity, Acceleration; Vector Properties; Free Fall Laboratory; Projectile Motion; Centripetal Force; Inclined Plane; Centre of Mass; Air Track; 2D Collisions; Basic Torque; Gravitational; Orbits; Spring & Pendulum; Damped Oscillator; Two Mass Oscillator; 2D Oscillator Heat - Microscopic Heat; Thermal Conduction; Calorimetry; Gas Flow; 1st Law of Thermodynamics; Ideal Gas Waves - Wave Addition; Waves on a Rope; Standing Waves; Interference Patterns; Tone Beats; Doppler; Shift 1; Doppler Shift 2; Lissajous Figures Optics - Colour Addition; Colour Subtraction; Snell's Law; Lenses; Fermat's Principle; Basic Prism Electricity and Magnetism - Coulomb Forces; Electric Fields; Cathode-Ray Tube; Magnetic Fields; Lenz's Law; Capacitor; Resistive Circuits; RC Circuits Fluids - Density Lab, Buoyancy Lab, Pressure & Depth, Bernoulli's Equation, Torricelli's Law, Flow Around a Wing

System Requirements: ***Windows*:** Windows 95/98/NT/2000/Me/XP, 486 or Pentium class processor, 16MB RAM. ***Macintosh*:** Mac OS 9, Mac OS X (runs natively on OS X)

Cat #: PCI-3

Exploration of Physical Sciences, Volume 2 - Wins & Mac

Exploration of Physical Science: Simulation Library Vol. II is a vast collection of 100 computer simulations encompassing a full-range of physical science topics. Developed by Dr. Carroll and Dr. Amiri of Weber State University, the software program utilizes a conceptual approach to teach physical science principles. The simulations are categorized into three learning levels: 1) introductory, 2) intermediate, and 3) advanced; addressing the needs of introductory physical science, high school physics, and college physics courses. The multi-level learning feature gives the software package a great deal of flexibility to meet a wide range of student needs. The Simulation Library Vol. II collection significantly broadens the scope of the Volume I collection. Each simulation re-creates a real world physical event, with the student given full control over the relevant experimental variables. Experimental parameters are easily manipulated using an assortment of slider controls; physical behaviours are animated on-screen using graphics that employ rich colour and depth; and physical quantities are displayed using digital readouts, graphs, and histograms. Each simulation has a readily accessible help screen providing information on using the simulation.

The vast collection of simulations may be used in a variety of ways: (1) as an instructor lecture aid for demonstration purposes in front of the classroom, (2) for student use as a computer-based lab activity. Exploration of Physical Science simulations can be used to introduce a physical science concept, or serve nicely to reinforce and extend a lab (involving apparatus) that has already been performed. The ready-to-run simulations and highly intuitive interface allows first time users to immediately use the simulations and begin exploring with no preliminary time investment - essentially providing a ready to go lab experience.

Simulations Contained in Volume 2: Forces and Motion - A car's linear velocity and acceleration graphs; Racing cars: Distance, velocity, and acceleration; Galileo's experiment: Falling and air resistance; Velocity and acceleration of a falling ball; Falling balls with air resistance; Free fall: Independence of velocity components; Throwing a banana to a falling monkey; Projectile motion: Horizontal and vertical motion; Projectile motion and acceleration; Trajectory of a ball with air resistance; Newton's 1st law: Puck on moving ice sheet; Newton's 2nd law: A dogsled race; Static and kinetic friction; Skidding cars and stopping distances; Air resistance with one parachute; Air resistance with two racing parachutes; Newton's 3rd law: Two astronauts playing catch; Newton's 3rd law: Rocket propulsion; Centre of mass of a drawn figure; Balancing people on a seesaw; Circular motion of a car on a race track; Circular motion of a sling: Tension and gravity; Angular momentum on a merry-go-round Momentum and Energy - Jumping from a cart: Conservation of momentum; Inelastic car crash in two-dimensions; Energy conservation of a falling ball; Energy conservation on a loop-the-loop; Energy conservation of a pendulum; Energy conservation of a mass on a spring; Bouncing balls and the coefficient of restitution; Elastic & inelastic colliding balls in one-dimension; Colliding balls in two-dimensions; Energy conservation of a bungee jumper; Effect of friction on a car rolling on inclined surfaces; Effects of friction/air resistance on skiing snowman Thermodynamics - The three phases of water and latent heat; The ideal gas law; Temperature, speed, and kinetic energy; The distribution of molecular speeds in a gas; Mixing in a box of gas particles; Entropy and the 2nd law of thermodynamics Vibrations, Waves and Sounds - Simple harmonic motion and the sine function; Simple harmonic and circular motion; Resonance of a damped, driven mass on a spring; Normal modes: Two masses connected by springs; Wave addition: Frequency, phase, and amplitude; The superposition of waves on a rope; Standing waves & harmonics: Strings/Organ Pipes; The superposition of sound waves; The Doppler effect and sonic booms; Ripple tank interference Electricity and Magnetism - Static electric

charges on a hanging pith ball; Charging and discharging an electroscope; Electric field lines and vectors; Trajectory of a test charge in an electric field; A light bulb and battery; Electric circuits and Ohm's law; Measurements of series and parallel circuits; The magnetic field of bar magnets; The magnetic field of a wire and solenoid; A proton in the Earth's magnetic field; Magnetic force on a current-carrying wire; Electric dipole radiation Light and Optics - Fizeau's experiment and the speed of light; The polarization of light and polarizing filters; The refraction of waves at a boundary; The refraction of light by prisms and raindrops; Additive and subtractive mixing of colours; Light rays and the formation of a real image; Ray tracing: Lenses and mirrors (5 simulations); Single-slit diffraction of light; Interference of light waves from two slits; Double-slit interference and diffraction patterns Relativity - The Michelson-Morley experiment; Relativity and simultaneity for a moving train; Length contraction; Time dilation; Racing trains: Newton's vs. Einstein's mechanics Modern Physics - Radioactive decay; The photoelectric effect: Measuring 5 metals; Double-slit electron interference; Three models of the atom; The atomic nucleus and Rutherford's experiment; Measurements of the quantum atom; The structure of matter: A salt crystal; The chemical bond Astronomy - Retrograde motion in geocentric/heliocentric systems, Planetary motion: Kepler's laws, The motion of a satellite orbiting Earth Chaos and Fractals - Motion of a chaotic pendulum, Sierpinski triangle; Pythagorean Tree Fluids - Measuring pressure in liquids; Mass, volume, density, and buoyancy

System Requirements: ***Windows*****:** Windows 95/98/NT/2000/Me/XP, 486 or Pentium class processor, 16MB RAM. ***Macintosh:*** Mac OS 7.1 or higher, 68040/33 MHz processor, or higher (Mac OS 7.5 or higher for PowerPC).

Cat #: PCI-8

Fundamental Science Skills - Wins & Mac

Each module presents an interactive self-guided lesson providing virtual one-on-one instruction. Topics include: measurement apparatus used in the lab, graphing skills, interpreting graphs, error analysis, understanding the process by which a scientific model is formulated, and developing an intuitive sense for the magnitude of various physical quantities when powers of 10 are involved. The topics were selected based upon instructor input of basic skills students were in most need of improving and basic areas where students lacked understanding.

Each learning module is comprised of the following components:

1) Introduction Screen: A thorough introduction to the topic is given so that no prior instruction is necessary.
2) Usage Screen: Students are taught the skills required to meet the learning objective along with information on how to use the interactive simulations.
3) Practice Screen: Students practice with graphic-rich interactive simulations that provide immediate feedback on how well the student is performing. Students are presented with many different practice opportunities allowing as much practice as necessary to master the objective.
4) Exam Screen: The on-screen exam tests if the student fully understands and has mastered the learning objective. The exam is automatically scored with the results shown on-screen along with the option to print-out the results for submitting to the instructor. Exams use randomized data so the instructor can be assured the student's work is not plagiarized.

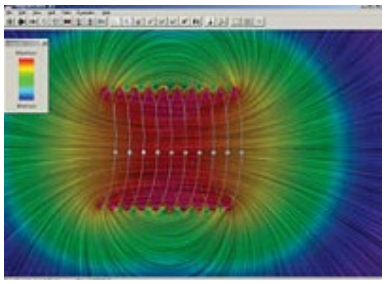
Learning Modules Included: Measurement Apparatus Triple-Beam Balance Graduated Cylinder Vernier Calliper Micrometer Meter Stick Graphing Skills Graphing Data Points Linear Graphs Interpreting Graphs Graphs & Inclined Tracks Game Error Analysis Mean and Standard Deviation Order of Magnitude (Powers of 10) Order of Magnitude: Mass Order of Magnitude: Distance Order of Magnitude: Speed Formulating a Scientific Model Ring Challenge Game

System Requirements: ***Windows:*** Windows 95/98/NT/2000/Me/XP, 486 or Pentium class processor, 16MB RAM. ***Macintosh:*** Mac OS 9, Mac OS X (runs natively on OS X).

Cat #: PCI-9

Magnetism 3D - Wins

Magnetism 3D utilizes colorful two-dimensional and three-dimensional graphics to display the magnetic field for current-carrying straight wires, current-carrying wire loops, solenoids, and permanent magnets. The three-dimensional graphics can be rotated in space about multiple axes for a true 3D perspective! The user is provided with a wide variety of simple to use tools that permit any desired configuration comprised of any number of objects to be created on-screen. Simply click the desired object from the toolbar, input the chosen parameters, and position the object on-screen.



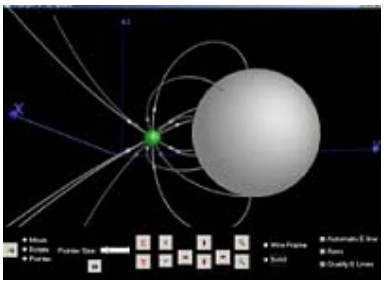
Software Features: View 2D & 3D magnetic field lines. Choose from a variety of magnetic field generating objects that may be used in any combination including: current-carrying straight wires, current-carrying wire loops, solenoids (with or without an iron core), and permanent magnets. All objects can be customized by inputting values such as current, length, radius, loops per centimeter.. View options include: 3D space, 3D topographic mapping, 2D surface, 2D color-coded mapping & linear integral convolution, and 2D iron filings. Option to display on-screen magnetic field vectors indicating individual contributions from various objects and net magnetic field for any location. Numeric display indicates strength of magnetic field at any location. Option to display the path of a charged particle as it moves under the influence of the magnetic field. Select the charged particle's mass, charge and velocity. Capability to explore Ampere's law by drawing a closed path with the amount of current passing through the enclosed surface automatically calculated. Designed for both high school and college physics courses.

System Requirements: Windows 95/98/NT/2000/Me/XP, 486 or Pentium class processor, 16MB RAM.

Cat #: PCI-6

Electrostatics 3D - Wins

Electrostatics 3D is an interactive software program that allows students to study electrostatics in a visually spectacular fashion! Electrostatics 3D utilizes colourful three-dimensional graphics to display electric potential and electric field lines for various types of charged objects. The stunning imagery brings a deeper understanding to electrostatics that has never before been achieved by other software visualization methods. In addition to displaying charges, electric field lines and equipotential surfaces in 3D space; three-dimensional topographical mapping is also utilized providing an easy to interpret highly-informative perspective.



All the various types of three-dimensional graphics can be rotated in space about multiple axes for a true 3D perspective!. The user is provided with a wide variety of simple-to-use tools that permit any desired charge configuration to be created on-screen. Simply click the desired object from the toolbar, input the chosen parameters, and position the object on-screen. The user has the option to work in a 2D environment or 3D environment. View 2D & 3D electric field lines and equipotential surfaces.

Choose from a variety of charged objects that may be used in any combination including: point charges, linear charges, plane charges with limited or unlimited length, grounded or isolated conductive spheres, conductive planes and di-electric boundaries.

View options include: 2D, 3D space, 3D topographic mapping, 2D colour-coded mapping, coloured linear integral convolution. Option to display on-screen electric field vectors indicating individual charge contributions and net electric field for any location. Numeric display indicates strength of electric field and electric potential at any location. Option to display the path of a charged particle as it moves under the influence of the electric field. Select the charged particle's mass, charge and velocity. Highly accurate calculations - potential determined by true mathematical integration (not inaccurate numerical calculation of integrals).

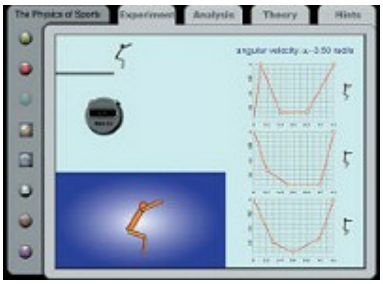
Designed for both high school and college physics courses.

System Requirements: Windows 95/98/NT/2000/Me/XP, 486 or Pentium class processor, 16MB RAM.

Cat #: PCI-4

Physics of Sport - Wins & Mac

Physics of Sports is a collection of computer simulations that illustrate the role played by physics principles in many popular sports. Each simulation models a particular sport with the student given full control over the relevant variables, creating a highly interactive tool to perform in-depth studies. With a high-degree of physical accuracy and versatility built into each simulation, students can explore the answer to such questions as: how is the velocity of a batted ball influenced by the mass of the bat and the contact point along the bat, how does body configuration affect the rotation of a platform diver, what is the most forgiving angle at which to shoot a basketball, or how does top-spin or back-spin affect the way a ball bounces? Developed with the goal of capturing student interest, the program contains 12 stand-alone simulations that model physics principles from a variety of sports: Basketball; Baseball; Gymnastics; Diving; Biking ; Downhill Skiing; Race Car Driving ; Weight Lifting; High Jump ; Hammer Throw



Each simulation contains four components:

1) the experiment screen where input parameters are varied and the resulting motion is animated using colourful graphics,

2) the analysis screen where results are displayed and can be examined with the aid of graphs that are generated based upon specific input parameters,

3) a theory screen that details the physics principles and equations governing the sport, and

4) a hints screen that provides guidance with performing the investigation. Physics of Sports may be used as an instructor lead demonstration in front of the classroom, or used by students as a computer-based lab activity. The simulations serve as a fun and engaging real-life application of fundamental physics principles, integrating smoothly into introductory level physics courses.

System Requirements: ***Windows:*** Windows 95/98/NT/2000/Me/XP, 486 or Pentium class processor, 16MB RAM. ***Macintosh:*** Mac OS 7.1 or higher, 68040/33 MHz processor or higher.

Cat #: PCI-5

Amusement Park Physics - Wins

The package includes a comprehensive collection of digitally imaged amusement park rides taken from a variety of amusement parks across the United States. Motion analysis in performed using World-in-Motion software - now included with the package. With Amusement Park Physics, students can investigate the exciting real world physics of amusement park rides. Having gathered position-time data from a number of frames in the digitised video clip, the motion of the ride can be fully studied: time, displacement, velocity, acceleration, momentum, force, and energy can all be readily measured.

Students can discover the magnitude of acceleration, or "g's", experienced by riders; a roller coaster's conversion of gravitational potential energy into kinetic energy; and the role of centripetal forces on the motion of rotating rides. In addition to studying amusement park rides, use World-in-Motion to analyze your own video clips.

With World-in-Motion, virtually any motion event that can be captured with a camcorder can be brought into the software for motion analysis, including one-dimensional, two-dimensional, circular, oscillatory and rotational motion.

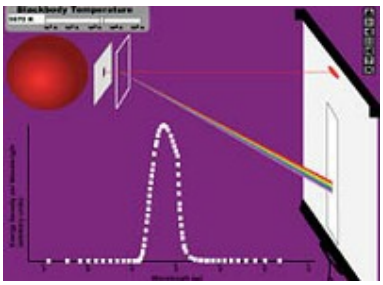
Amusement park rides from numerous amusement parks across the United States, including Six Flags Magic Mountain in California, Six Flags Great America in Illinois, Valley Fair in Minnesota, and Six Flags over Texas. Ideally suited as a preparation or follow-up activity for Amusement Park Physics Day. High quality digitised clips at full screen resolution (640 x 480). Motion Analysis Software included. Includes teacher guide with student activity sheets.

System Requirements: Windows 95/98/NT/2000/Me/XP, 486 or Pentium class processor, 16MB RAM.

Cat #: PCI-7

Modern Physics Visualized - Wins

This engaging software package puts the abstract concepts of modern physics into an understandable context by utilizing highly visual and highly interactive computer simulations. Using computer animation that is governed by user input, students are able to interactively study model led physical behaviour that previously may have only been presented in the form of an equation or static diagram. Time dilation, the particle nature of light, atomic models, and probability waves are all brought to life! By fully utilizing the computer medium, Modern Physics Visualised brings understanding to modern physics topics in ways that go beyond that offered by a textbook. The package consists of 10 stand-alone modules that introduce modern physics topics in a visually creative fashion.



Each module contains three components:

1) an interactive simulation where students gain an intuitive understanding of the topic by performing an investigation,
2) a history section detailing the pioneering work and background of the contributing physicists, and
3) a theory section that provides a clear and graphic-rich explanation of the central principles related to the topic.

The following topics are covered: Blackbody Radiation The Photoelectric Effect Compton Scattering Rutherford Scattering The Bohr Model of the Hydrogen Atom De Broglie, Schrodinger & Probability Waves Heisenberg Uncertainty Principle Theory of Relativity - The Speed of Light Theory of Relativity - Length Contraction Theory of Relativity - Time Dilation Modern Physics Visualised may be used as an instructor lead demonstration in front of the classroom, or used by students as a computer-based lab activity. The program is designed to integrate smoothly into a unit or course on modern physics.

System Requirements: Windows 95/98/NT/2000/Me/XP, 486 or Pentium class processor, 16MB RAM.

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