

# PHYSICAL SCIENCES SOFTWARE

Cat.# PCI-8 - FUNDAMENTAL SCIENCE SKILLS - Version 2.5

Windows & Macintosh

Self-Guided Interactive Learning Modules for Windows & Macintosh

Fundamental Science Skills is a unique program that utilizes the computer as an instructional tool to its fullest extent. The program contains interactive learning modules that teach vital skills students need early-on in a physics or physical science course. 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, developing an intuitive sense for the magnitude of various physical quantities when powers of 10 are involved, and common student misconceptions. 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

**Measurement Apparatus:** Triple-Beam Balance, Graduated Cylinder, Vernier Caliper, Micrometer, Meter Stick

**Interpreting Graphs:** Graphs & Inclined Tracks Game

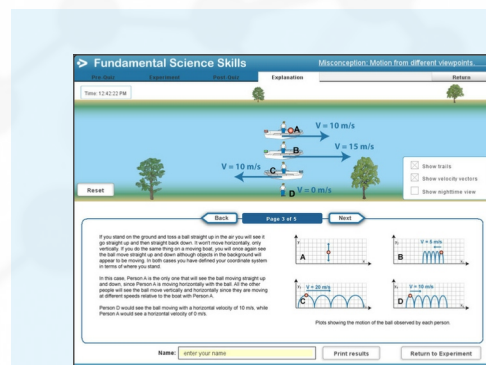
**Error Analysis:** Mean and Standard Deviation

**Order of Magnitude (Powers of 10):** Order of Magnitude, Mass, Order of Magnitude, Distance, Order of Magnitude, Speed

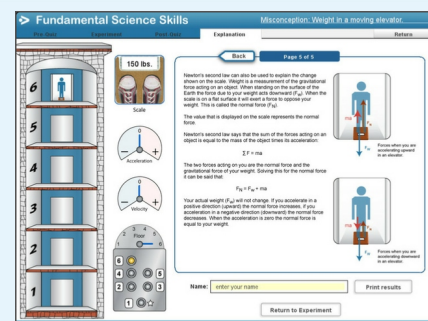
**Graphing Skills:** Graphing Data Points, Linear Graphs

**Formulating a Scientific Model:** Ring Challenge Game

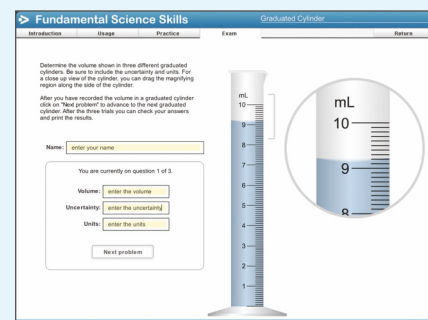
**Common Student Misconceptions:** Motion from Different Viewpoints, What is Your Weight in Space?, Weight in a Moving Elevator, Are Heavier Sleds Faster?, Are Shorter Paths Faster? (Crossing a Flowing River), Motion of a Thrown Object, Heavier Objects in Collisions, How Quickly Do Things Fall



*Misconception: Motion from Different Viewpoints - A ball bouncing on a moving boat is observed from several different reference frames.*



*Misconception: Weight in a Moving Elevator. An elevator accelerates upward (or downward), moves at a constant speed, then decelerates and comes to rest. The person's weight as seen on a scale is displayed along with an acceleration and velocity meter.*



*Graduated Cylinder Module. Using different types of graduated cylinders, students receive guidance and practice making accurate scientific measurements.*

**Fundamental Science Skills** Graphing Data Points

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Fundamental Science Skills** Order of Magnitude: Distance

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Fundamental Science Skills** Graphs & Sloping Tracks

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Linear Graphs Module.** Students gain experience drawing best-fit lines by comparing their line to one that is generated from a least-squares fitting method. The linear equation that represents the data is then determined. Interpolation and extrapolation of data are also performed.

**Order of Magnitude (Distance) Module.** This module is designed to help students attach physical meaning to distances that have wide ranging orders of magnitude, and understand what each power of 10 increase in distance actually represents.

**Graphs & Sloping Tracks Module.** Presented with graphs of position, velocity, and acceleration plotted against time, students must setup an arrangement of sloping tracks so that a frictionless puck sliding on the tracks will reproduce the motion shown in the graphs.

## Triple Beam Balance Module

**Fundamental Science Skills** Triple Beam Balance

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Fundamental Science Skills** Triple Beam Balance

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Fundamental Science Skills** Triple Beam Balance

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

Students receive guided practice using a triple-beam balance. While massing various objects, feedback is given as to how well proper procedure is followed when zeroing the balance, using the riders, reading the mass and estimating the final significant digit. Students then proceed to the Exam screen where they're evaluated on how well they use the balance to mass several objects. 1. Introduction Screen 2. Practice Screen 3. Exam Screen.

## Scientific Model/Ring Challenge Module

**Fundamental Science Skills** Ring Challenge - Formulating a Scientific Model

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Fundamental Science Skills** Ring Challenge - Formulating a Scientific Model

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Fundamental Science Skills** Ring Challenge - Formulating a Scientific Model

Introduction | **Practice** | Exam | Return

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

**Check answers** You have checked your answers 9 times. 3 of the 10 objects are in the correct location.

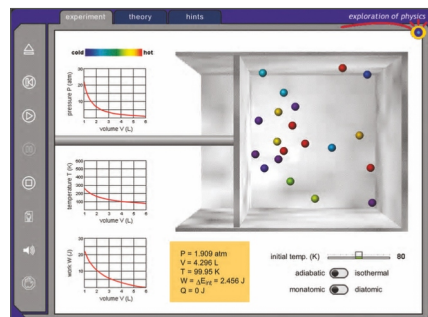
Students discover the process of how a scientific theory or model is formulated by means of a game. Rings are suspended from rods inside a sealed box, the location of the rings must be determined by withdrawing the rods. Without ever seeing inside the box, students assemble a ring-configuration model that explains their observations. Upon withdrawing rods in a different order or direction in future trials, students find their model must go through a series of modifications to explain new observations. 1. Introduction Screen 2. Usage Screen 3. Exam Screen.

**System Requirements:** Windows XP/Vista/7/8/10 and Mac OSX 10.6 - 10.11.

Available as a Single User, 10 computer, 30 computer and Unlimited licences.  
Prices are on [page 19](#)

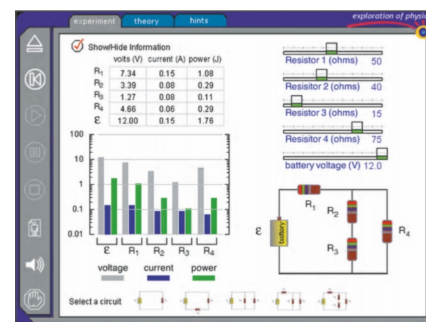
Comprehensive software library of physics simulations and labs covering a full year of introductory physics — Mechanics, Waves, Heat, Fluids, Optics, and Electricity & Magnetism.

*Exploration of Physics: Simulation Library Volume 1, Version 3.1* has earned the reputation of being the most comprehensive and in-depth physics simulation software package available! The 64 highly interactive stand-alone simulations and labs 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 re-creates 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 also has a readily accessible detailed student lab-guide that provides specific direction for carrying out the lab investigation. The vast collection of simulations and labs 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.



## LIST OF SIMULATIONS VOLUME 1

### Mechanics

- Motion Graphs
- Vector Properties
- Free Fall Laboratory
- Projectile Motion
- Force Table
- Inclined Plane
- Connected Masses on Two Inclines
- Centripetal Force
- Gravitational Orbits
- Cavendish Experiment
- Center of Mass
- Air Track
- 2D Collisions
- Basic Torque
- Spring & Pendulum
- Damped Oscillator
- Two Mass Oscillator
- 2D Oscillator

### Heat

- Microscopic Heat
- Thermal Conduction
- Calorimetry
- Gas Flow
- 1st Law

### Thermodynamics

- Ideal Gas
- Adiabatic/Isothermal Compression
- Carnot Cycle

### Fluids

- Density Lab
- Buoyancy Lab
- Pressure & Depth
- U Tube
- Bernoulli's Equation
- Torricelli's Law
- Flow Around a Wing

### Waves

- Wave Addition
- Waves on a Rope
- Standing Waves
- Interference Patterns
- Thin Film Interference
- Multiple-Slit Interference
- Resolution: Diffraction at a Circular Aperture
- Intensity of Sound
- Tone Beats
- Doppler Shift 1
- Doppler Shift 2
- Lissajous Figures

### Electricity & Magnetism

- Coulomb Forces
- Electric Fields
- Magnetic Fields
- Trajectory in E & B Fields
- Cathode-Ray Tube
- Lenz's Law
- Motion of Charge Carriers through Conducting Wire
- Capacitor Properties
- Resistive Circuits
- Capacitor Circuits
- RC Circuits

### Optics

- Colour Addition
- Colour Subtraction
- Basic Prism
- Snell's Law
- Lenses
- Fermat's Principle
- Polarization

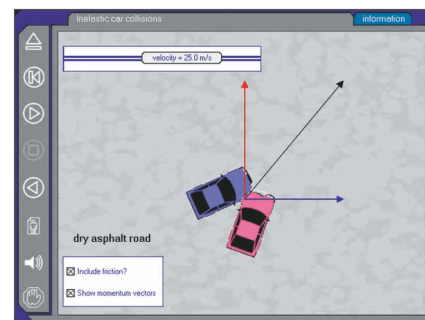
**System Requirements:** Windows XP/Vista/7/8/10 and Mac OSX 10.6 - 10.11.



*Exploration of Physical Science: Simulations Volume II* is a vast collection of over 100 computer simulations and labs encompassing a full-range of physical science topics. Designed to be highly interactive and highly visual, the software program utilizes a simulated lab 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 Volume II collection is designed to complement and work along with the Volume I collection found on the preceding two pages. 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 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. The vast collection of simulations and labs 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.



*2D Car Collision: By selecting initial velocity, mass, and a dry asphalt road or frictionless ice surface, changes in velocity and momentum are studied.*

## LIST OF SIMULATIONS VOLUME 2

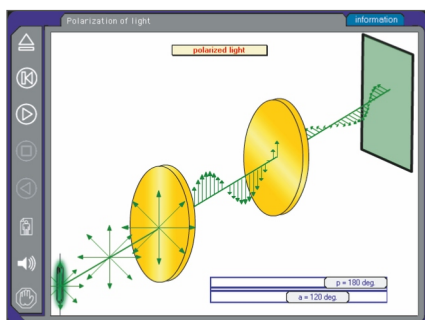
### Forces and Motion

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  
 Time of 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: Inertia of 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

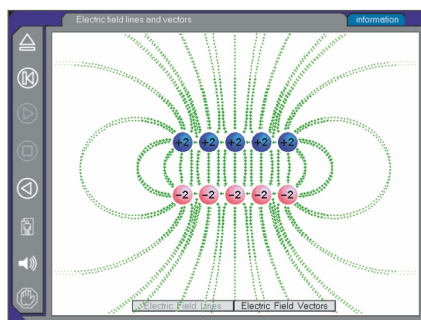
Centre of mass of a drawn figure  
 Balancing people on a seesaw  
 Circular motion of a car on a race track  
 Circular motion of a sling: Tension and gravity  
 Angular momentum on a merry-go-round

### Momentum and Energy

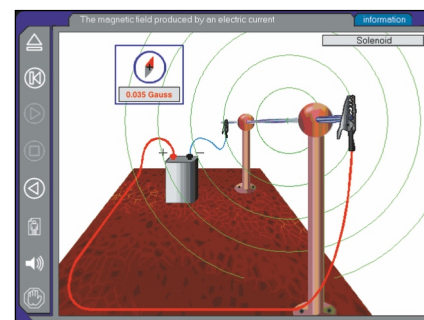
Jumping from a cart: The conservation of momentum  
 Inelastic car crash in two-dimensions  
 Energy conservation of a falling ball  
 Energy conservation on a loop-the-loop  
 Energy conservation of a pendulum  
 Energy conservation of a mass on a spring  
 Bouncing balls and the coefficient of restitution  
 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 a skiing snowman



*Polarization of Light: By rotating a pair of polarizer and analyzer plates, changes in the electric field vectors and light intensity are observed.*



*Electric Field: Having arranged the electric charges, students can view the electric field lines, or click the mouse to see the electric field vector at that location.*



*Magnetic Field: Selecting either a long straight wire or solenoid, a compass can be moved to any position to measure the direction and strength of the field.*

## Fluids

Measuring pressure in liquids  
Mass, volume, density, and buoyancy

## 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

## 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 Sound

Simple harmonic motion and the sine function  
Simple harmonic and circular motion  
Resonance of a damped, driven mass on a spring  
Normal modes of two masses connected by springs  
Wave addition: Frequency, phase, and amplitude  
The superposition of waves on a rope  
Standing waves & harmonics: Strings and organ pipes  
The superposition of sound waves  
The Doppler effect and sonic booms  
Ripple tank interference

## 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 colors  
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

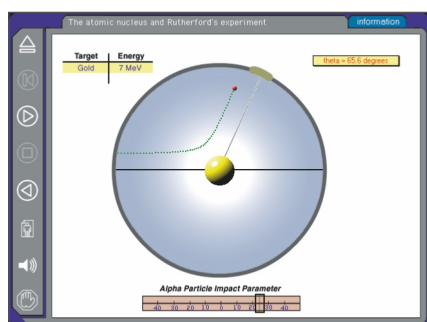
## Astronomy

Retrograde motion in geocentric & heliocentric systems  
Planetary motion: Kepler's laws  
The motion of a satellite orbiting Earth

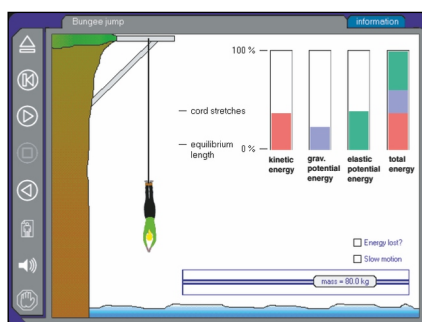
## Chaos and Fractals

Motion of a chaotic pendulum  
Sierpinski triangle  
Pythagorean Tree

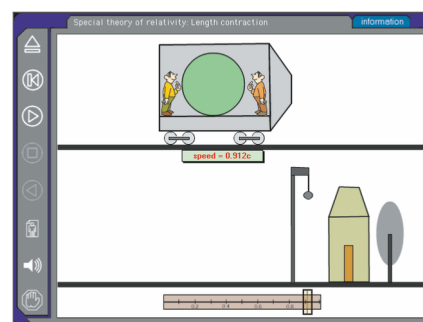
**System Requirements:** Windows XP/Vista/7/8/10 and Mac OSX 10.6 - 10.11



*Rutherford's Experiment: Having selected the target nucleus, and energy/impact parameter for the incoming alpha particle, the scattering angle is measured.*



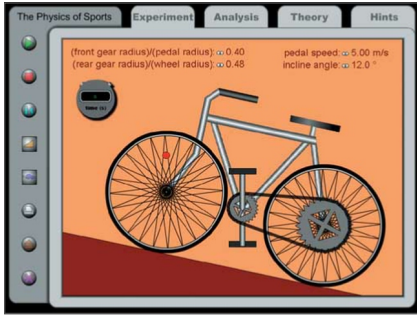
*Conservation of Energy: Changes in kinetic energy, gravitational potential energy, and elastic potential energy are studied for a bungee jumper.*



*Length Contraction: After selecting the train's speed (% speed of light), length contraction is seen from the ground observer's & train observer's reference frame.*

Available as a Single User, 10 computer, 30 computer and Unlimited licences.  
Prices are on [page 19](#)

**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?



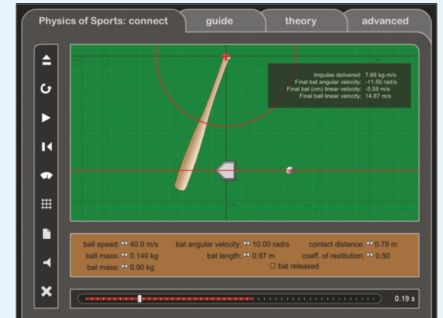
Developed with the goal of capturing student interest, the program contains 12 stand-alone simulations that model physics principles from a variety of sports: Basketball, Baseball, Gymnastics, Diving, Biking, Downhill Skiing, Race Car Driving, Weight Lifting, Vertical Jump, Hammer Throw.

Each simulation contains four components:

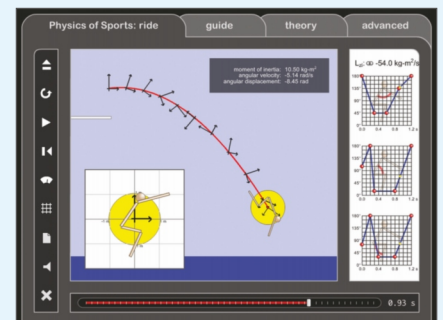
- (1) *experiment* screen where input parameters are varied and the resulting motion is animated;
- (2) *advanced* screen where results can be analyzed with the aid of graphs;
- (3) *theory* screen that details the physics principles and equations governing the sport;
- (4) *guide* screen that provides detailed student guidance for performing the investigation.

### PHYSICS OF SPORT SIMULATIONS

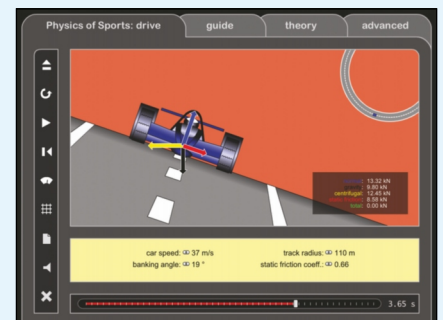
1. Baseball: Swinging a Bat  
(Conservation of Linear and Angular Momentum)
2. Baseball: Batted Ball's Trajectory  
(Projectile Motion, Air Resistance)
3. Baseball: Pitching a Curveball  
(Projectile Motion, Magnus Force)
4. Basketball: Bounce Pass with Rotation  
(Impulse, Kinetic Friction)
5. Basketball: Variables in Shooting a Basket  
(Projectile Motion)
6. High Dive: Diver Rotation and Body Configuration  
(Conservation of Angular Momentum, Moment of Inertia, Center of Mass)
7. Downhill Skiing  
(Newton's Second Law, Kinetic Friction, Mechanical Energy)
8. Race Car: Traveling on a Banked Curve  
(Newton's Second Law, Centripetal Acceleration, Static Friction)
9. Gymnastics: High Bar Analysis  
(Torque, Angular Momentum)
10. Bicycling: Pedaling Uphill with Varying Gear Ratios  
(Force, Torque, Mechanical Energy)
11. Weightlifting: Biceps Curl  
(Torque, Work, Power)
12. Vertical Jump: Attaining Maximum Height  
(Force, Torque, Moment of Inertia, Angular Velocity)
13. Billiard Balls: Collisions with Friction & Angular Velocity  
(Conservation of Momentum, Impulse, Kinetic Friction, Rolling Motion)
14. Bungee Jump: Force and Acceleration Analysis  
(Free-Fall Motion, Drag Force, Simple Harmonic Motion)
15. Circular Hammer Throw  
(Rotational Motion, Centripetal and Tangential Acceleration)



Students explore factors that affect the velocity of a batted ball – including pitch speed, bat speed, ball mass, bat mass, contact point on bat, and coefficient of restitution.

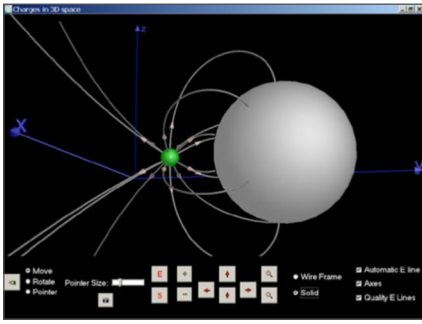


By precisely specifying changes in the diver's body configuration over time, students observe how the resulting changes in the diver's moment of inertia affect rotation and entry into the water.



Students study the motion of a race car on a circular track. By varying car speed, banking angle, track radius, and coefficient of friction, the resulting forces are examined with a free-body diagram.

**System Requirements:** Windows 98/2000/XP/Vista/7. Mac OS X 10.4 - 10.7 (ver 1.0 available for OSX v10.3 and lower).



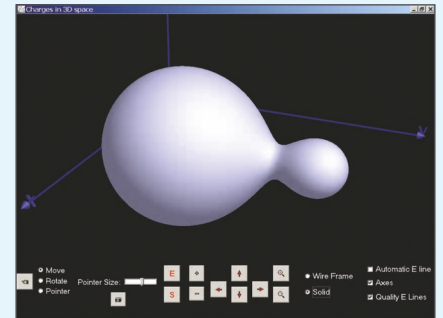
**Electrostatics 3D** is an interactive software program that allows students to study electrostatics in a visually spectacular fashion! *Electrostatics 3D* utilizes colorful two-dimensional and three-dimensional graphics to display electric potential and electric field lines for various types of charged 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 a 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.

#### Software Features:

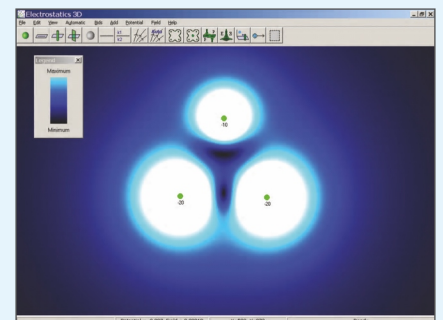
- View 2D & 3D electric field lines and equipotential surfaces.
- Choose from a variety of charged objects that may be used in any combination including: point charges, linear charges, plane charges with limited or unlimited length, grounded or isolated conductive spheres, conductive planes and di electric boundaries.
- View options include: 2D surface, 3D space, 3D topographic mapping, 2D colour-coded mapping & 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.
- Option to use right-handed or left-handed coordinate system in 3D environment.

**System Requirements:** Windows 98/2000/XP/Vista/7.

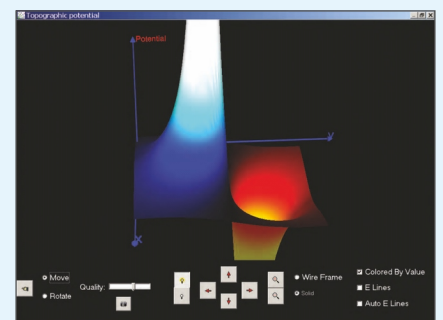
An Magnetism 3D & Electrostatic 3D Bundle is also available. See [page 19](#) for prices.



*Three-dimensional view of an equipotential surface produced by a pair of like, but unequal, point charges. Equipotential surfaces can be drawn from any selected location in 3D space.*



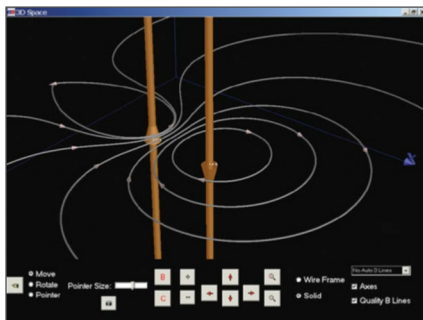
*Colour-coded display indicating the strength of the electric field surrounding three like point charges.*



*Three-dimensional topographic mapping of electric potential surrounding a pair of opposite point charges. The 3D graphic can be rotated about multiple axes.*

Available as a Single User, 10 computer, 30 computer and Unlimited licences.  
Prices are on [page 19](#)





**Magnetism 3D** is an interactive software program that allows students to study magnetic fields using a variety of stunning visualization methods. *Magnetism 3D* utilizes colourful two-dimensional and three-dimensional graphics to display magnetic field lines for current-carrying 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,

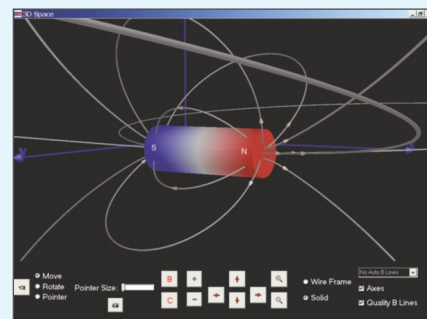
input the chosen parameters, and position the object onscreen

#### Software Features:

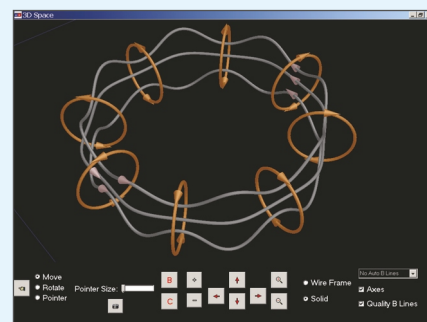
- View 2D & 3D magnetic field lines.
- Choose from a variety of magnetic field generating objects that may be used in any combination including: current-carrying straight wires, current-carrying wire loops, solenoids (with or without an iron core), and permanent magnets.
- All objects can be customized by inputting values such as current, length, radius, loops per centimetre . . .
- View options include: 3D space, 3D topographic mapping, 2D surface, 2D colour-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.
- Capability to explore Ampere's law.
- Option to use right-handed or left-handed coordinate system in 3D environment.

**System Requirements:** Windows 98/2000/XP/Vista/7.

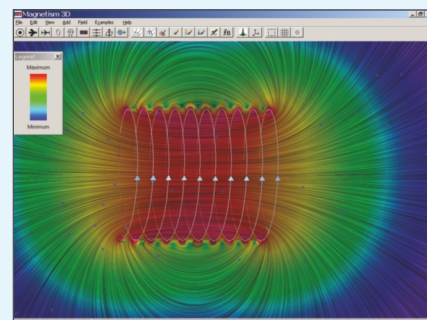
A Magnetism 3D & Electrostatic 3D Bundle is also available. See [page 19](#) for prices.



*Three-dimensional display of magnetic field surrounding a cylindrical permanent magnet. Zoom-in to study the field in the vicinity around the object, or zoom-out to investigate the field at great distances.*



*Current-carrying wire loops arranged in a circle and the resulting magnetic field lines shown in three dimensions. Any number of magnetic field lines can be drawn. All 3D graphics can be rotated about multiple axes to generate a real-world perspective.*



*Two-dimensional display of magnetic field produced by a solenoid. Continuous magnetic field lines (linear integral convolution) are shown with colour coding indicating field strength..*

Available as a Single User, 10 computer, 30 computer and Unlimited licences.  
Prices are on [page 19](#)