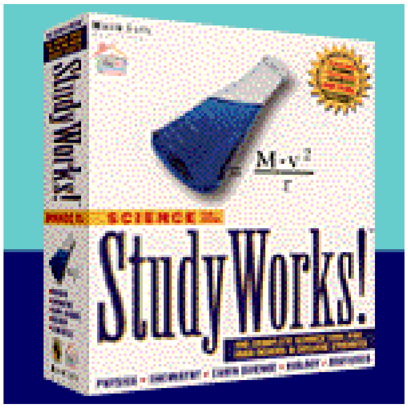
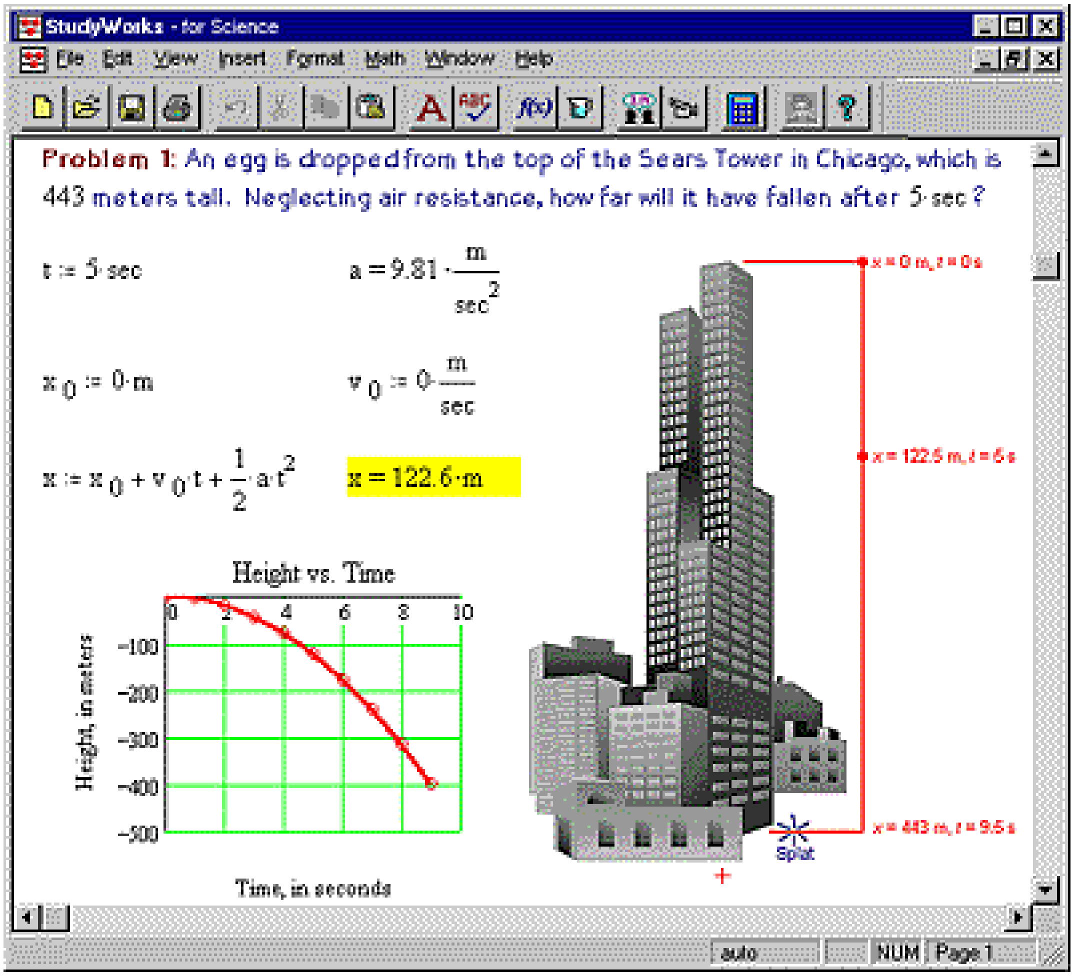
StudyWorks™ for Science



Platform: Windows and Macintosh
Available on CD-ROM only
Available for ground shipment

Imagine a full-screen graphing calculator and a math-smart word processor combined into one integrated tool. Now imagine an electronic encyclopedia of facts and formulas at your fingertips and a built-in Web link that lets you connect with other students and pick up hints on your homework. StudyWorks is an all-in-one study tool that helps you work faster, more accurately -- and learn more at the same time. Calculate, graph, access helpful information -- then create great-looking documents that combine text, formulas and graphics. You'll find hundreds of drag-and-drop equation, in-depth explanations, worked-out examples and lots of great illustrations, graphs, and animations to strengthen problem-solving skills.

Features & Specs | Product Sample | Screen Shots | Back to Product List

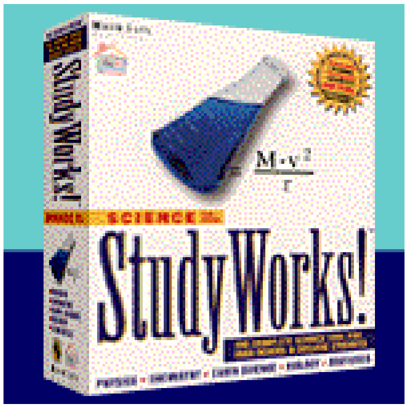


In a StudyWorks worksheet, you can write equations, perform calculations, create graphs, even add text -- anywhere you want.

StudyWorks for Science covers core concepts in physics and statistics and key examples from chemistry, biology, and earth science. Topics include: Earth and Solar System, Genetics, Thermochemistry, Motion and Acceleration, Electromagnatism, Probability, and more.

StudyWorks™ for Science

FEATURES & SPECS (page 1 of 3)



StudyWorks!™ for Science covers core concepts in physics and statistics and key examples from chemistry, biology, and earth science. Some of the topics include:

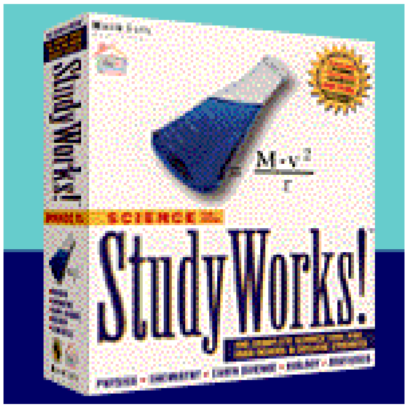
Earth and solar system
Erosion
Plate techtonics
Ecosystems
Weather and climate
Genetics
Population
Stoichiometry
Properties of gases
Thermochemistry
Properties of solids
Properties of solutions
Acids and bases
Reaction rates
Forces and momentum
Motion and acceleration
Energy
Waves
Thermodynamics
Light and optics
Electric currents
Electromagnetism
Quantum theory
Data Analysis
Probability
Correlation and regression

Perform all the numeric and symbolic calculations you'll ever need

- Work with numbers, variables, functions, equations, vectors, matrices.
- Units of measurement and dimension checking.
- Statistics and data analysis functions.
- Matrix operations including determinants, dot products, cross-products, inverse, and transpose.
- Derivatives, integrals, summations and products.

Product Sample
Screen Shots
Back to Product List

StudyWorks™ for Science



FEATURES & SPECS (page 2 of 3)

- Find roots of a polynomial.
- Solve equations and systems of equations.
- Trigonometric, exponential and hyperbolic functions.
- Symbolic integration and differentiation.
- Expand, simplify and factor expressions.

Turn data and functions into powerful graphs

- X-Y and polar plots, vector plots, 3-D scatter, bar, contour, surface and parametric surface plots.
- Annotate and format graphs.
- Trace and zoom.
- Animation.

StudyWorks is live and interactive

- Change inputs and watch StudyWorks recalculate the result.
- A unique environment for exploring and understanding math and science concepts.

Get the online help you need

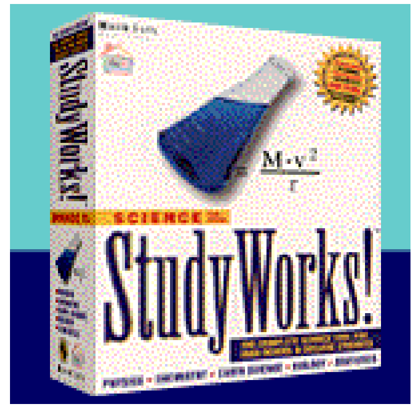
- Online science reference book includes standard formulas, research material and information.
- Move information from the reference book to a StudyWorks worksheet with drag-and-drop ease.
- Online animated tutorial and context-sensitive help provide answers to a wide range of questions and problems.
- A special section offers help in preparing for the SAT II tests.

Create great-looking documents in seconds

- WYSIWYG report writer makes it easy to prepare presentation-quality homework papers and lab reports.
- Includes print preview and technical spell checker.
- Export worksheets to Microsoft Word for full word-processing capabilities.

Product Sample
Screen Shots
Back to Product List

StudyWorks™ for Science



FEATURES & SPECS (page 3 of 3)

Plus all the right connections

- Import data from TI, Casio and HP graphing calculators for analysis and integration with text and graphs in StudyWorks.
- Send worksheets to classmates and teachers using most major e-mail systems.
- Browse our special home page for high school students and teachers on the World Wide Web.
- Link with other worksheets on the Web.

System Requirements

Windows

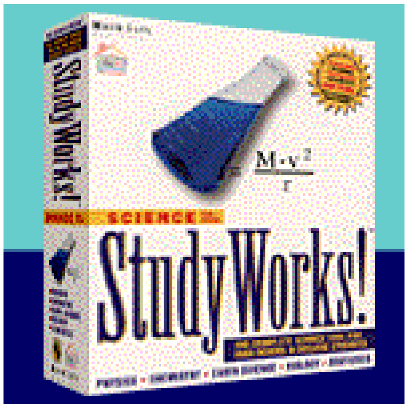
IBM PC or compatible (486 or higher)
Microsoft Windows 3.1 (or higher) or Windows '95, 8 MB of RAM and 10 MB of swap space
14 MB of free disk space
SVGA color monitor
CD-ROM drive
Web link requires internet access

Macintosh

PowerMac or 68040 (PowerMac recommended)
8 MB of RAM
16MB of free disk space
CD-ROM drive
Macintosh System 7.1 or later
Web link requires internet connection and MacTCP

Product Sample
Screen Shots
Back to Product List

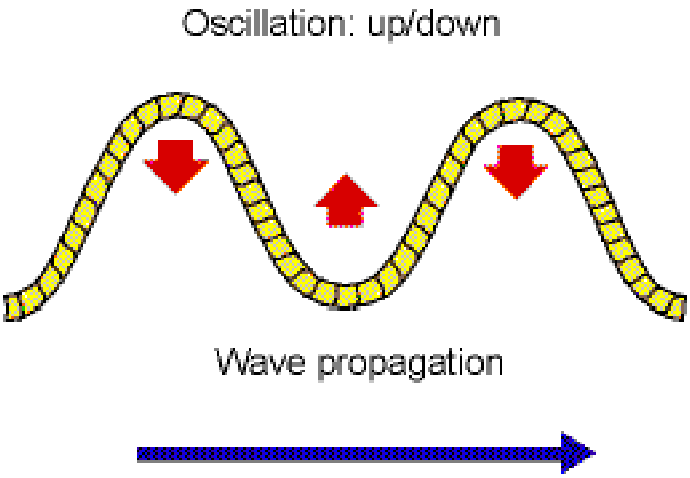
StudyWorks™ for Science



SAMPLE PAGE (page 1 of 4)

Waves: Equation of a Traveling Wave

The traveling wave equation describes evolution of a wave both in time and in space. For example, sound and light propagation is described using traveling waves. See also **Waves Made Simple**.



Variables

Wavelength: λ

Velocity: v

Amplitude: A

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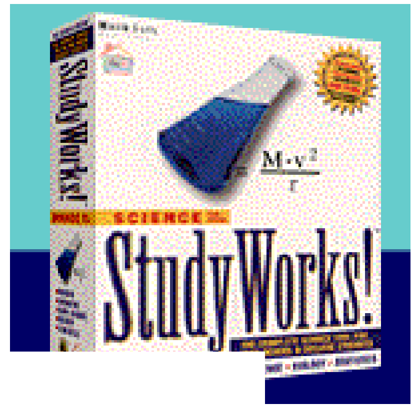

SAMPLE PAGE (page 2 of 4)

Formulas

Period: $T = \frac{\lambda}{v}$

Wave number: $k = \frac{2 \cdot \pi}{\lambda}$

Angular frequency: $\omega = \frac{2 \cdot \pi}{T}$

Equation of traveling wave (traveling to the right): $y(x,t) = A \cdot \sin(k \cdot x - \omega \cdot t)$

Example

Let us construct a sinusoidal traveling wave with the following parameters:

Amplitude: $A := 5$

Wavelength: $\lambda := 10 \cdot m$

Propagation velocity: $v := 2 \cdot \frac{m}{sec}$

The other wave parameters can now be calculated using the equations given above:

Period:

$T := \frac{\lambda}{v}$ $\quad T = 5 \cdot sec$

Wave number:

$k := \frac{2 \cdot \pi}{\lambda}$ $\quad k = 0.63 \cdot m^{-1}$

Angular frequency:

$\omega := \frac{2 \cdot \pi}{T}$ $\quad \omega = 1.26 \cdot \frac{rad}{sec}$

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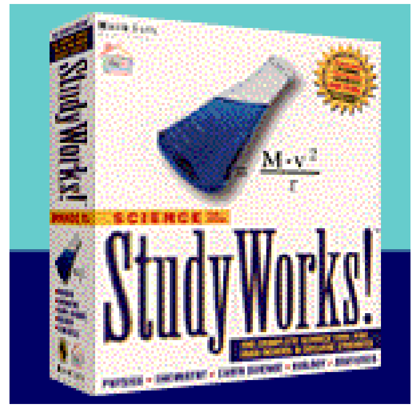
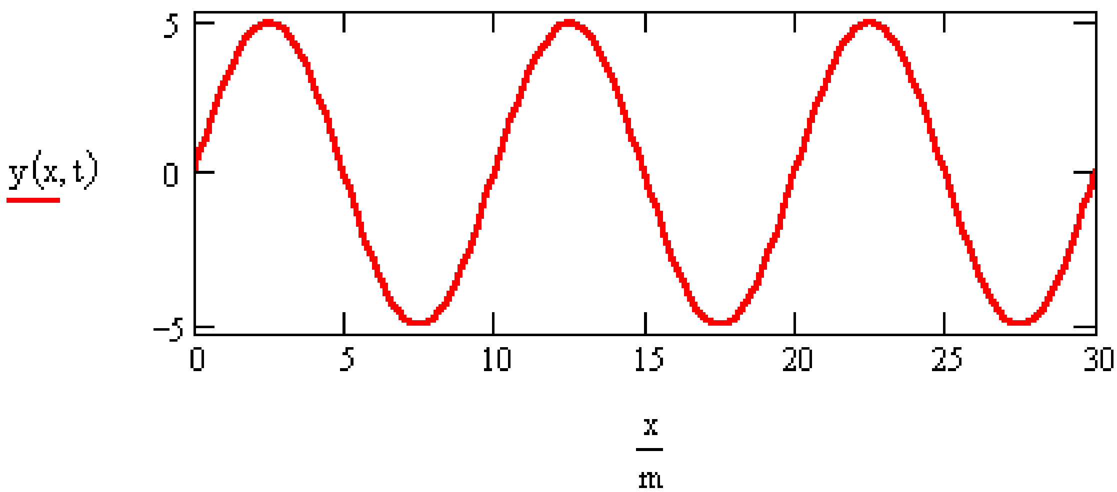


SAMPLE PAGE (page 3 of 4)

We are now ready to graph this wave:

$y(x,t) := A \cdot \sin(k \cdot x - \omega \cdot t)$ $\qquad x := 0 \cdot m, \frac{\lambda}{50} .. 3 \cdot \lambda$

$t := 0 \cdot sec$ at the instant zero



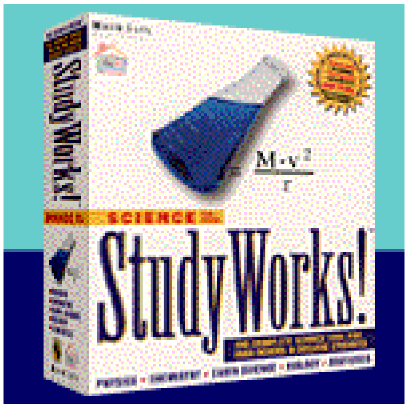
Features & Specs

Screen Shots

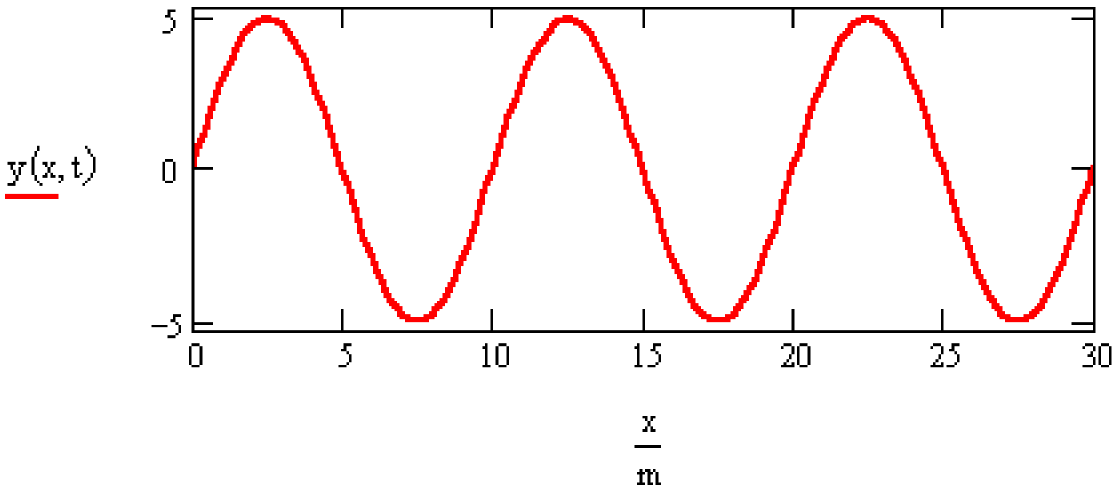
Back to Product List

StudyWorks™ for Science

SAMPLE PAGE (page 4 of 4)



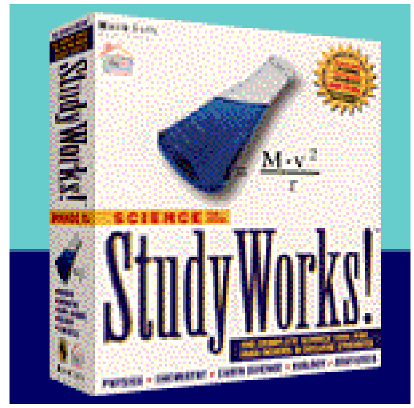
And by using StudyWorks' animation feature, we can visualize this traveling wave even better. Click on the plot below to see an animation (Windows AVI file, size 395K) of the traveling wave.

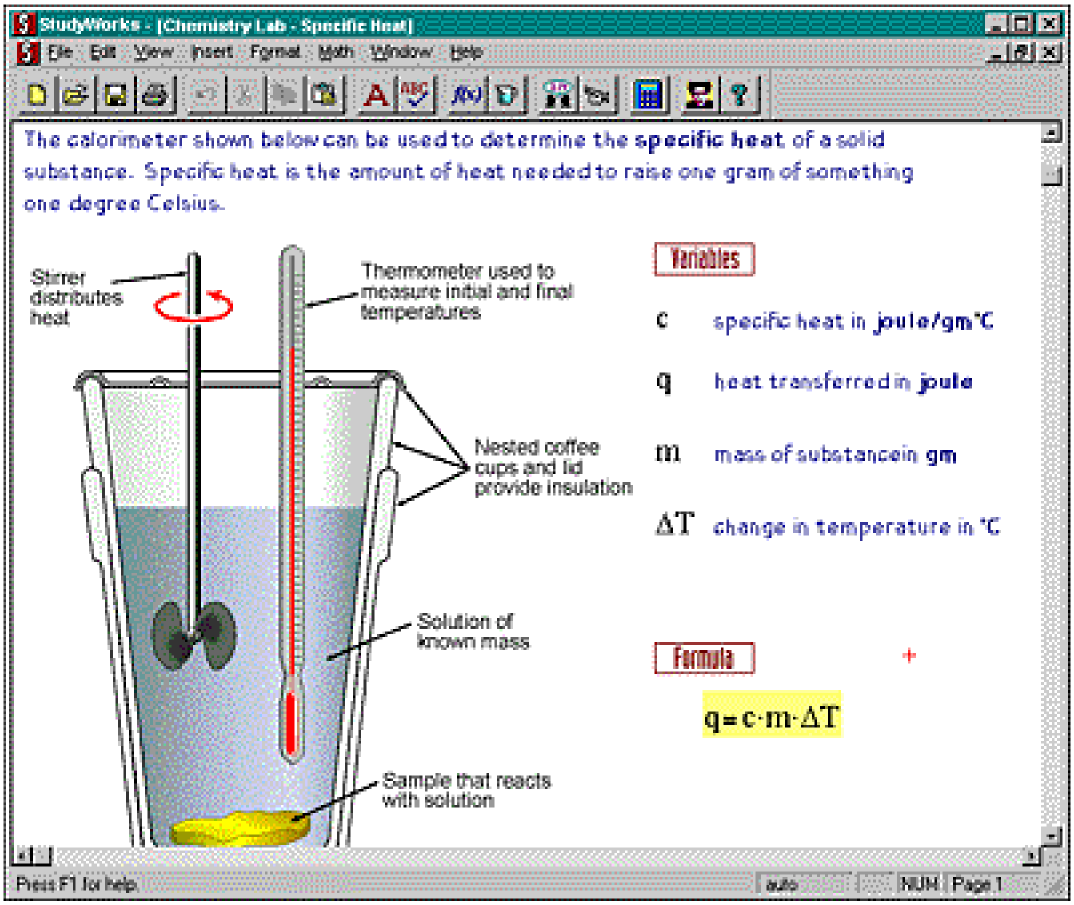


Features & Specs
Screen Shots
Back to Product List

StudyWorks™ for Science

SCREEN SHOTS (page 1 of 5)





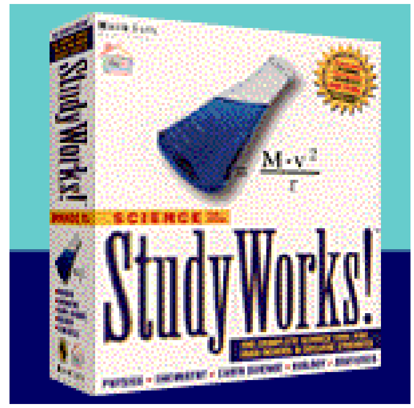
Students can hand in homework assignments that are easy to read. They can combine equations, text, graphs, even illustrations into one great-looking document. Equations and formulas can be annotated with explanatory text so you know how well your students understand the concepts behind your work. In a StudyWorks worksheet, you can write equations, perform calculations, create graphs, even add text -- anywhere you want.

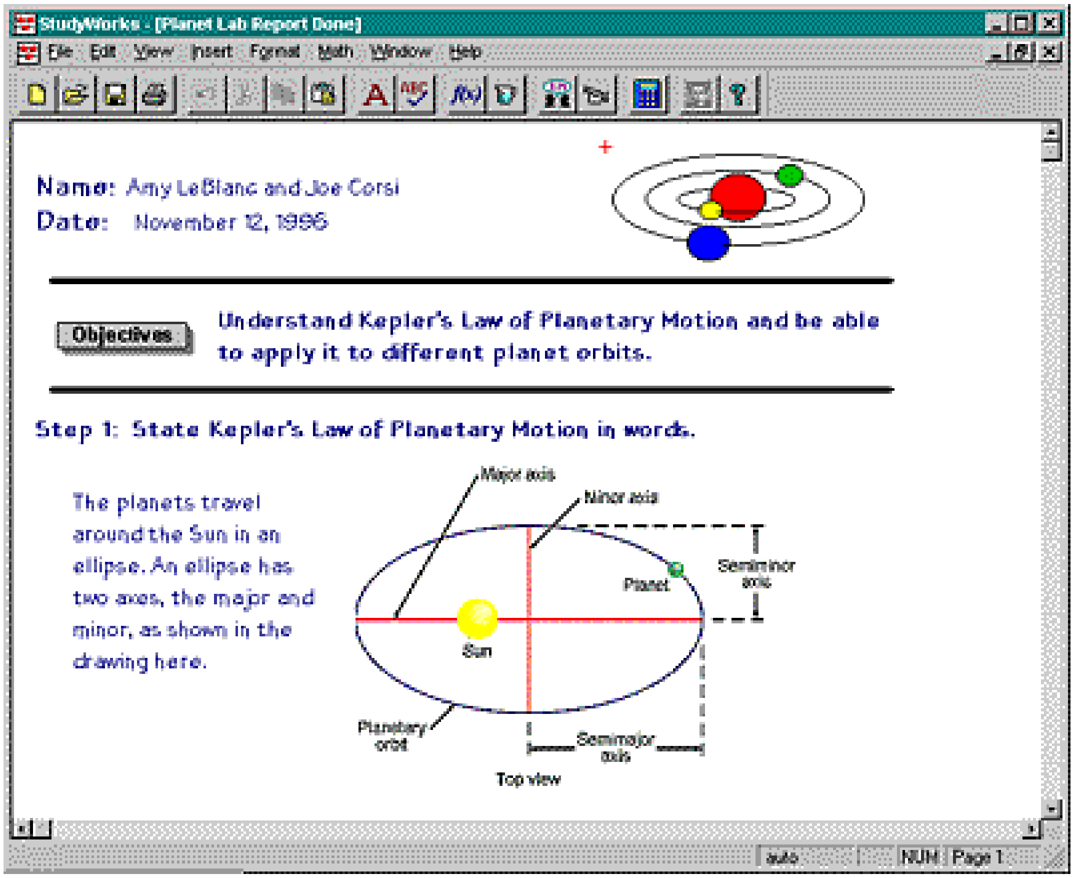
Features & Specs

Product Sample

Back to Product List

StudyWorks™ for Science





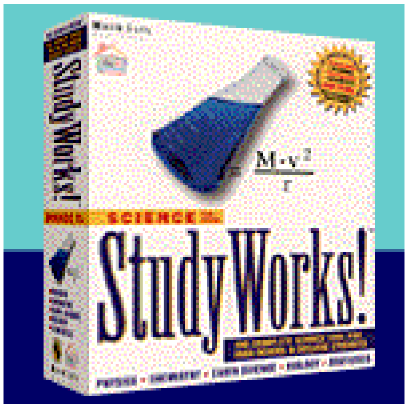
Features & Specs

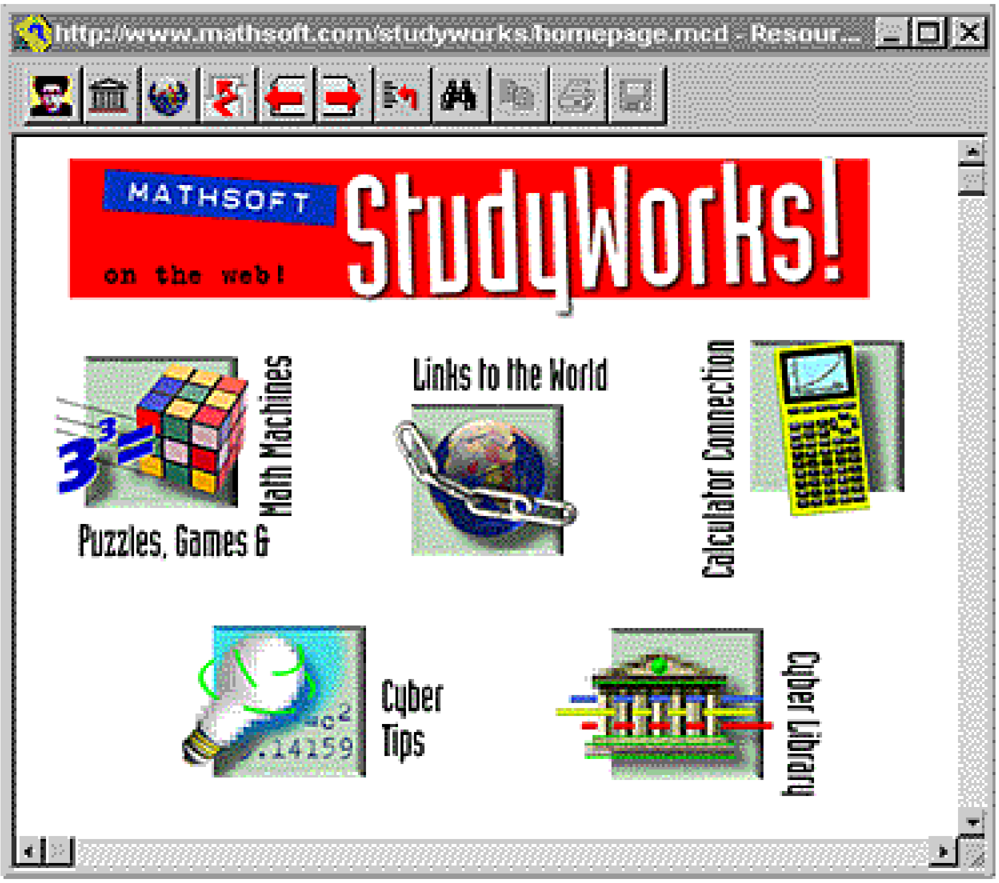
Product Sample

Back to Product List

StudyWorks™ for Science

SCREEN SHOTS (page 3 of 5)





With Internet access, the StudyWorks Web Link gives you continuously updated information and links to other interesting sites

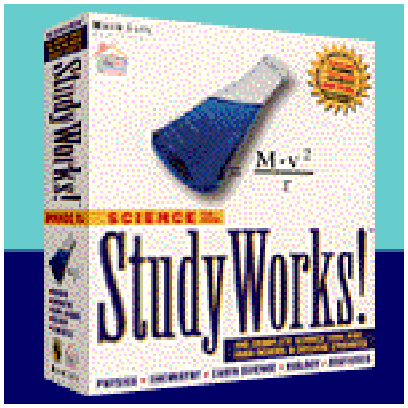
Features & Specs

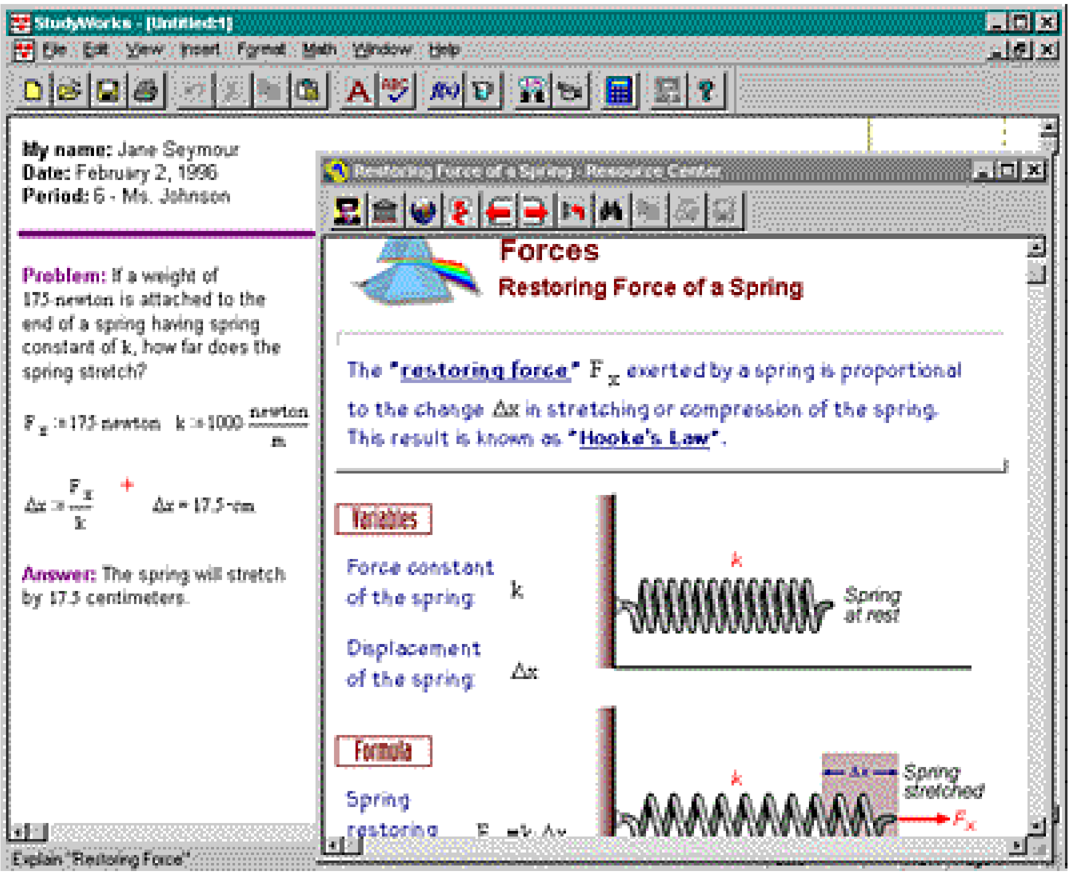
Product Sample

Back to Product List

StudyWorks™ for Science

SCREEN SHOTS (page 4 of 5)





Features & Specs

Product Sample

Back to Product List

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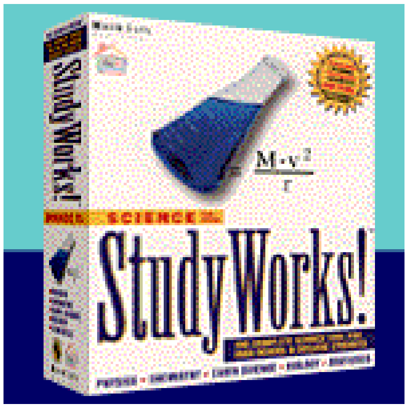
StudyWorks™ for Science

SCREEN SHOTS (page 5 of 5)



The StudyWorks reference library covers a wide range of math and science subjects, including algebra, calculus, statistics, earth science, biology, chemistry and physics.

Features & Specs

Product Sample

Back to Product List