

StudyWorks™ for Science

Platform: Windows and Macintosh

Available on CD-ROM only

Available for ground shipment



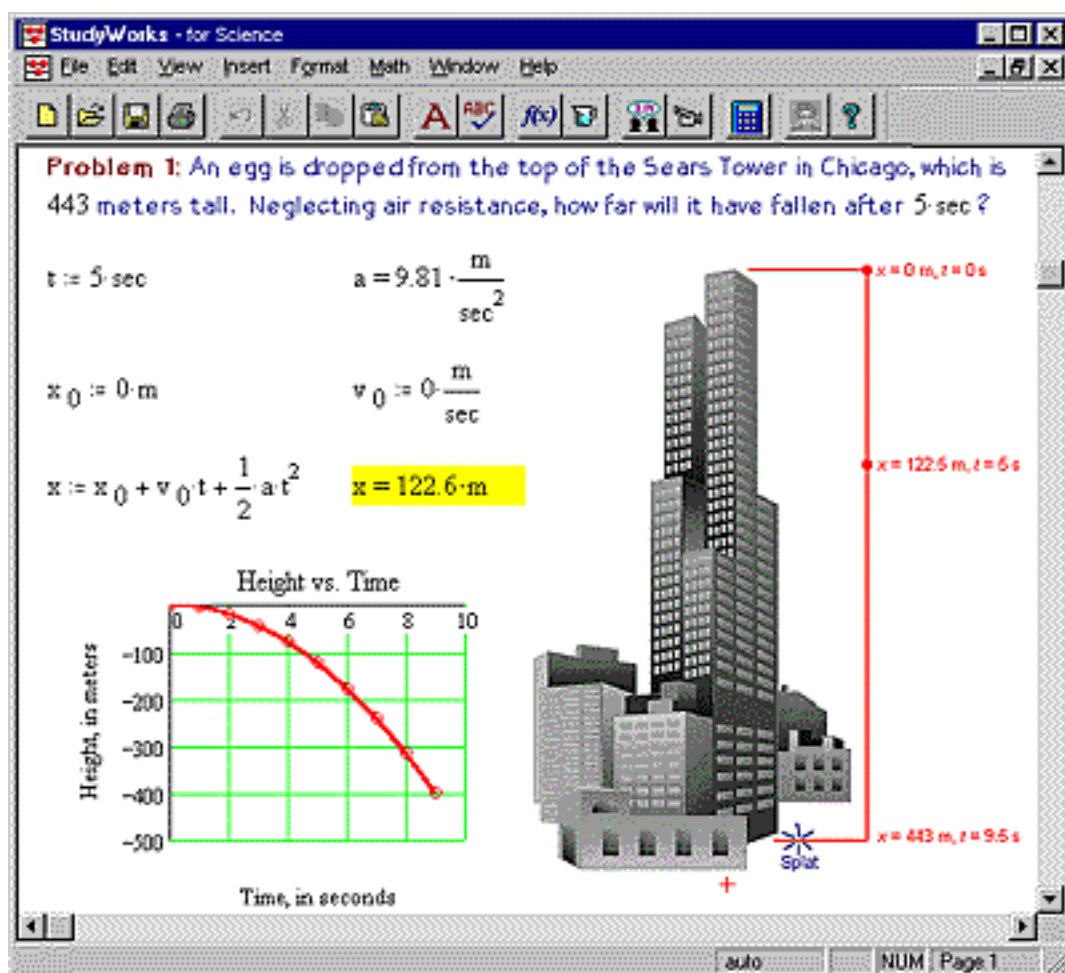
Imagine a full-screen graphing calculator and a math-smart word processor combined into one integrated tool. Now imagine an electronic encyclopedia of facts and formulas at your fingertips and a built-in Web link that lets you connect with other students and pick up hints on your homework. StudyWorks 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.

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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, Electromagnetism, Probability, and more.

StudyWorks™ for Science

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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.

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- 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.

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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



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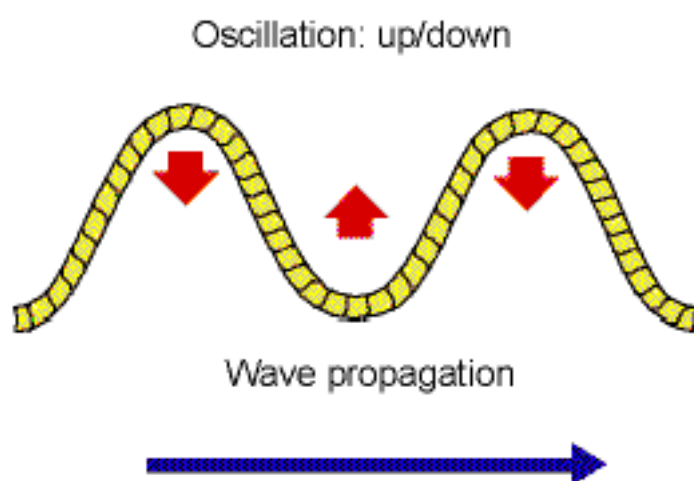
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Waves: Equation of a Traveling Wave

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**.

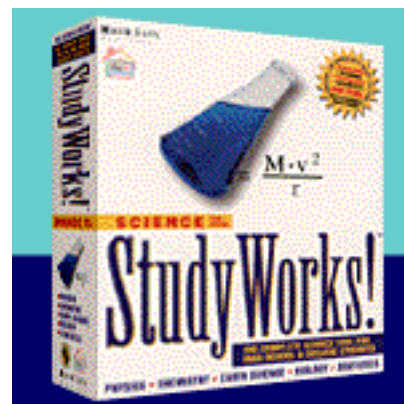


Variables

Wavelength: λ

Velocity: v

Amplitude: A



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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:

$$\lambda := 10 \cdot \text{m}$$

Propagation velocity:

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

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

Period:

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

$$T = 5 \cdot \text{sec}$$

Wave number:

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

$$k = 0.63 \cdot \text{m}^{-1}$$

Angular frequency:

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

$$\omega = 1.26 \cdot \frac{\text{rad}}{\text{sec}}$$



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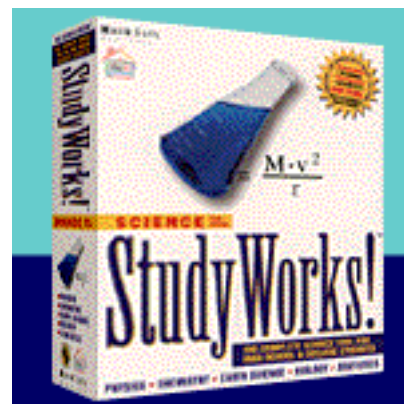
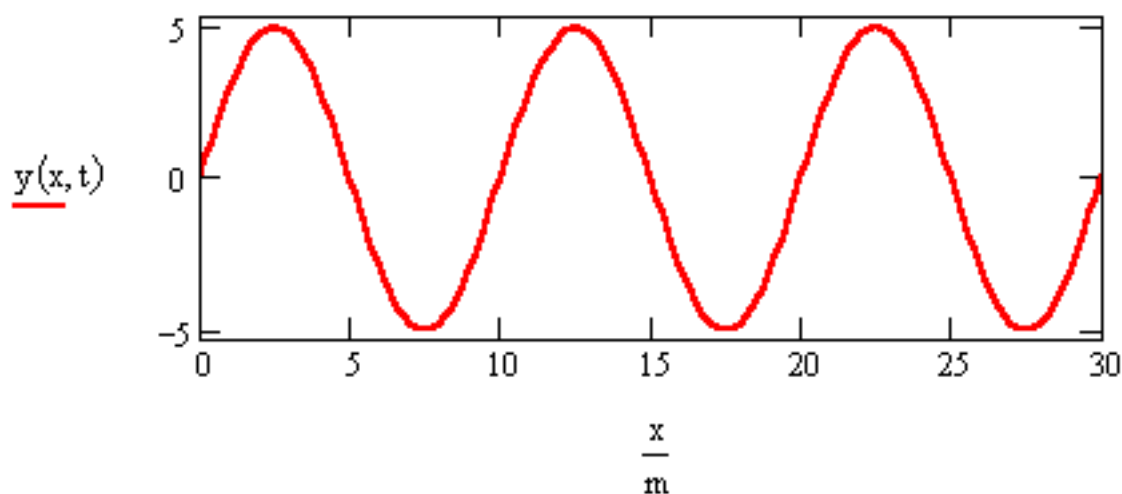
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We are now ready to graph this wave:

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

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



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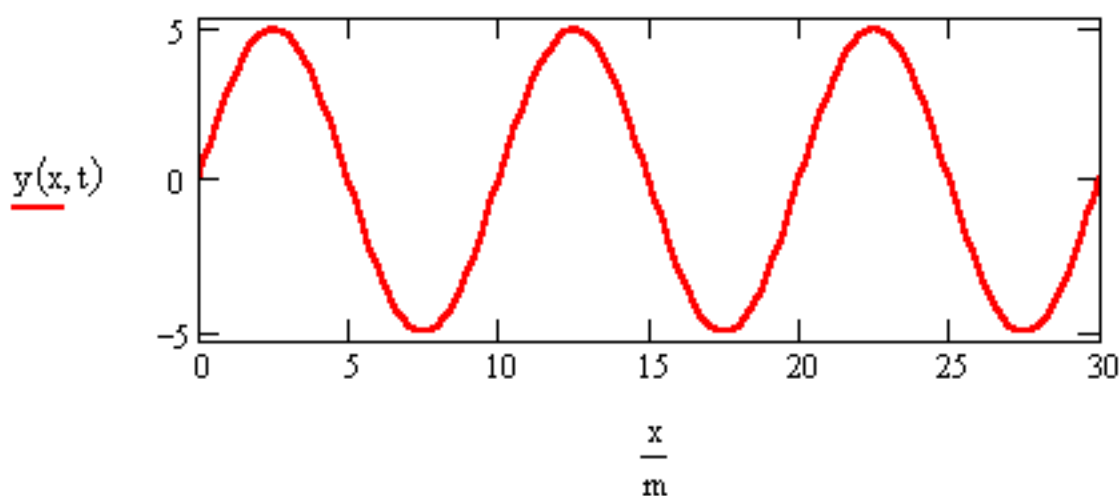
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And by using StudyWorks' animation feature, we can visualize this traveling wave even better. Click on the plot below to see an animation (Windows AVI file, size 395K) of the traveling wave.



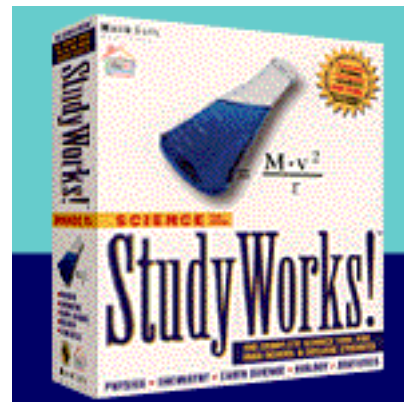
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The screenshot shows a worksheet titled "StudyWorks - [Chemistry Lab - Specific Heat]". The interface includes a menu bar (File, Edit, View, Insert, Format, Math, Window, Help) and a toolbar with various icons. The main text reads: "The calorimeter shown below can be used to determine the specific heat of a solid substance. Specific heat is the amount of heat needed to raise one gram of something one degree Celsius."

The diagram of the calorimeter is labeled with the following parts:

- Stirrer distributes heat
- Thermometer used to measure initial and final temperatures
- Nested coffee cups and lid provide insulation
- Solution of known mass
- Sample that reacts with solution

Variables:

- c specific heat in joule/gm°C
- q heat transferred in joule
- m mass of substance in gm
- ΔT change in temperature in °C

Formula:

$$q = c \cdot m \cdot \Delta T$$

At the bottom, it says "Press F1 for help" and "NUM Page 1".

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.

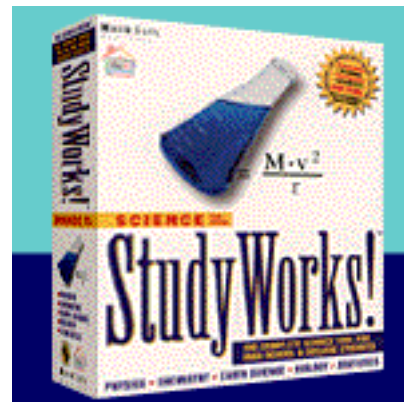
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StudyWorks - [Planet Lab Report Done]

File Edit View Insert Format Math Window Help

Name: Amy LeBlanc and Joe Corsi
Date: November 12, 1996

Objectives Understand Kepler's Law of Planetary Motion and be able to apply it to different planet orbits.

Step 1: State Kepler's Law of Planetary Motion in words.

The planets travel around the Sun in an ellipse. An ellipse has two axes, the major and minor, as shown in the drawing here.

The diagram shows a top-down view of an elliptical orbit. A yellow circle labeled "Sun" is at one focus. A green circle labeled "Planet" is on the orbit. The major axis is a horizontal red line passing through the Sun. The minor axis is a vertical red line. The semimajor axis is the distance from the Sun to the planet along the major axis. The semiminor axis is the distance from the center of the ellipse to the top or bottom edge. The entire ellipse is labeled "Planetary orbit". The text "Top view" is at the bottom.

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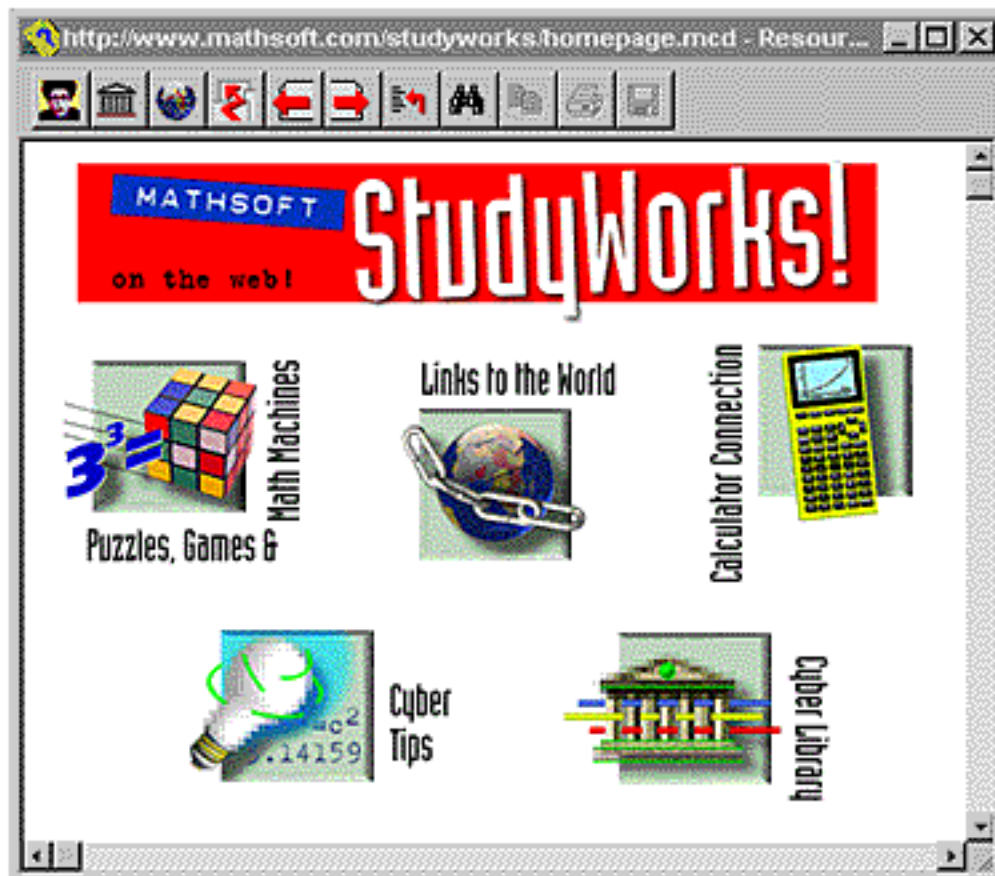
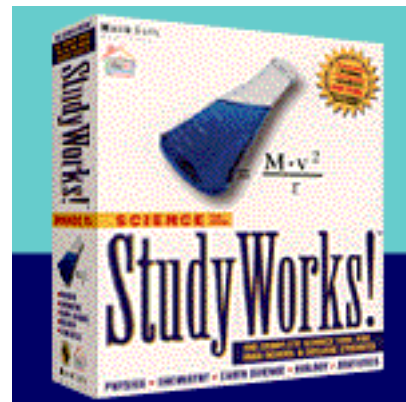
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With Internet access, the StudyWorks Web Link gives you continuously updated information and links to other interesting sites

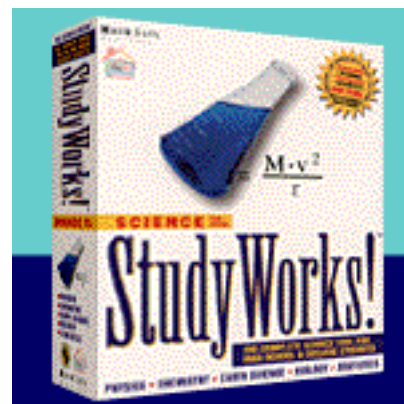
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The screenshot displays the StudyWorks! software interface. The main window is titled "StudyWorks! - [Untitled:1]" and contains a menu bar (File, Edit, View, Insert, Format, Math, Window, Help) and a toolbar. The left sidebar shows user information: "My name: Jane Seymour", "Date: February 2, 1996", and "Period: 6 - Ms. Johnson". The main content area is titled "Restoring Force of a Spring - Resource Center" and includes a "Forces" section with a rainbow icon. The text explains Hooke's Law: "The 'restoring force' F_x exerted by a spring is proportional to the change Δx in stretching or compression of the spring. This result is known as 'Hooke's Law'." Below this, the "Variables" section lists "Force constant of the spring: k " and "Displacement of the spring: Δx ". The "Formula" section shows "Spring restoring $F = -k \Delta x$ ". A diagram illustrates a spring at rest and then stretched by Δx , with a red arrow labeled F_x indicating the restoring force. The problem text on the left asks: "Problem: If a weight of 175 newton is attached to the end of a spring having spring constant of k , how far does the spring stretch?" and provides the solution: "Answer: The spring will stretch by 17.5 centimeters." The calculation shown is $F_x = 175 \text{ newton}$, $k = 1000 \frac{\text{newton}}{\text{m}}$, and $\Delta x = \frac{F_x}{k} = 17.5 \text{ cm}$.

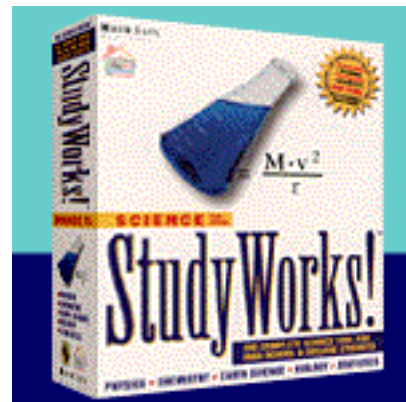
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The StudyWorks reference library covers a wide range of math and science subjects, including algebra, calculus, statistics, earth science, biology, chemistry and physics.

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