# EXPERIENCE *MATHEMATICA*® IN EDUCATION

*FROM CONCEPT TO CLASSROOM TO CLUSTERS*

# INSTANTLY MAKE LESSONS INTERACTIVE

Everything from sine waves to planetary motion paths and even algebraic equations can be interactive in *Mathematica*. With a single function, `Manipulate`, *Mathematica* gives you immediate access to a huge range of powerful interactive capabilities to produce compelling educational content. You can easily create sophisticated interfaces that you and your students can control to see results in real time, often with a single line of code.
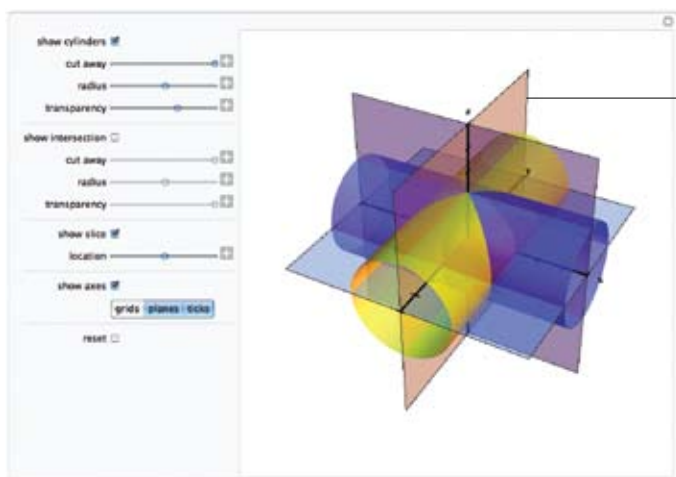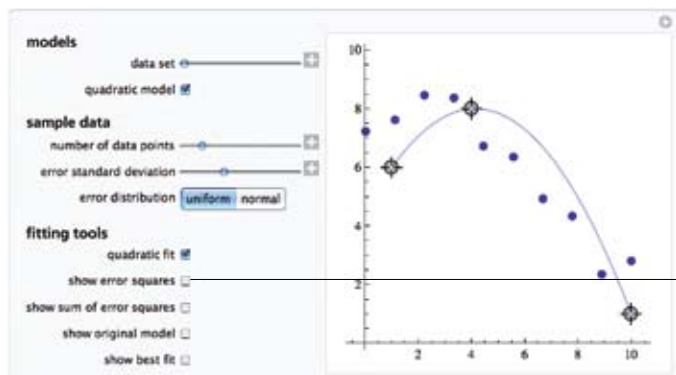


**INTERSECTION OF TWO CYLINDERS**

Real-time 3D graphics can be rotated and controlled or exported to all standard 3D graphics formats.

Immediately explore parameters, using dynamic controls to manipulate your computations in real time.
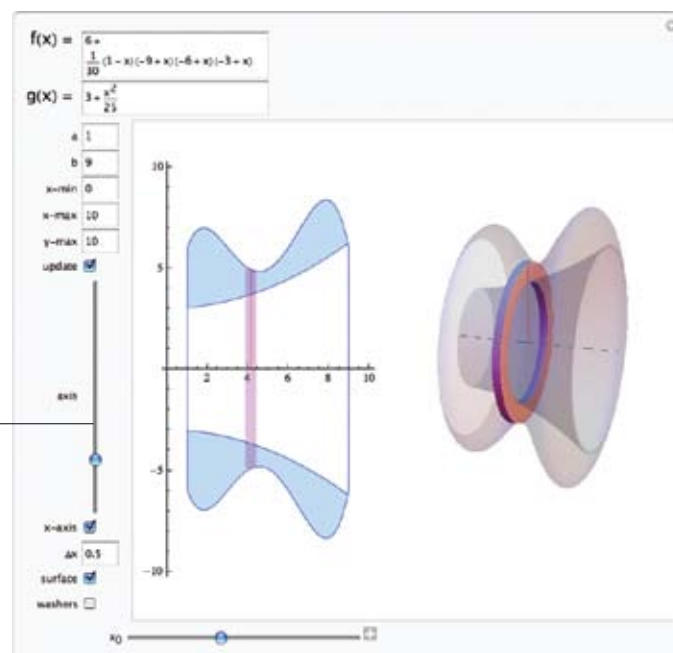


**SOLIDS OF REVOLUTION**



**LINEAR AND QUADRATIC CURVE FITTING PRACTICE**

Built-in controls allow you to create powerful interfaces complete with sliders, checkboxes, buttons, and more.

➡ wolfram.com/screencasts/makingmodels
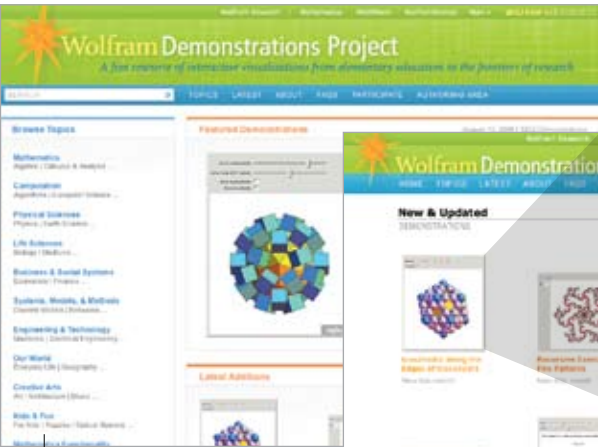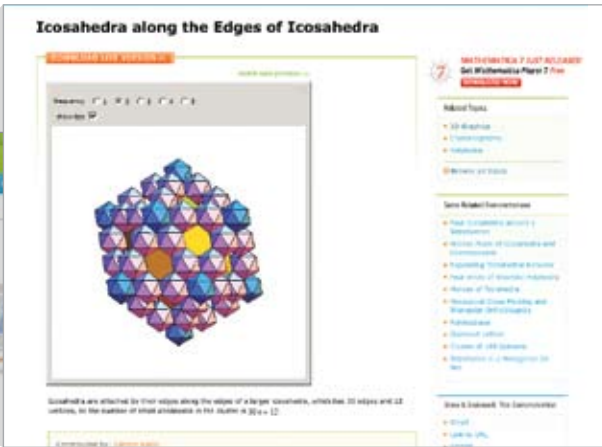
## THE WOLFRAM DEMONSTRATIONS PROJECT

**demonstrations.wolfram.com**

The Wolfram Demonstrations Project is an open-code resource of thousands of ready-to-use models for your classroom. These Demonstrations use dynamic computation to bring to life concepts in mathematics, science, engineering, art, finance, and a remarkable range of other fields. Use these Demonstrations to find sample code and examples of *Mathematica* technology at work, or to help you visualize classroom concepts. They can also shed new light on your cutting-edge research, or help you create your own sophisticated mini-applications to publish online.
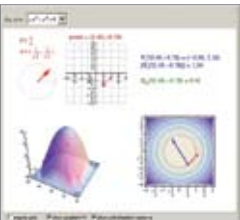
From elementary education to front-line research, topics span an ever-growing array of categories.
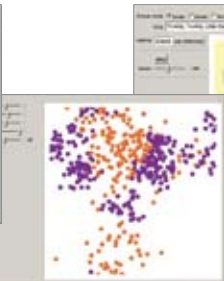
There are thousands of Demonstrations already available to you, with more added every day.

### DEMONSTRATIONS SPAN MANY DIFFERENT DISCIPLINES AND DEPARTMENTS

*Mathematica* brings computational explorations to the widest possible audience. Here are just a few examples:
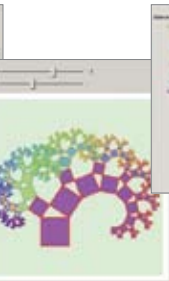
**PHYSICS**

**BIOLOGY**

**MUSIC**

**IMAGE PROCESSING**

**MECHANICAL ENGINEERING**

**DESIGN**

**ASTRONOMY**

## EASE OF USE
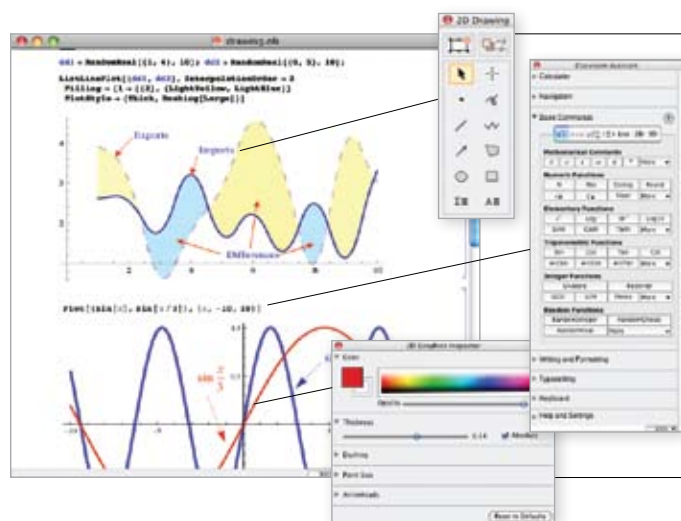
Use the **2D Drawing Tools** palette to easily create and annotate 2D graphics for quizzes, presentations, and more.

The **Classroom Assistant** palette lets you quickly enter calculations with the click of the mouse.

The **2D Graphics Inspector** allows you to interactively change graphic styles like color, line thickness, and dashing.

*Mathematica* offers a collection of Assistant palettes and graphical user interfaces that provide immediate point-and-click access to an extensive range of *Mathematica* capabilities. The Assistant palettes serve as convenient entry points for novice users, especially in education, and provide shortcuts for experienced users.

> wolfram.com/screencasts/classroomassistant

## INTEGRATED DATA

*Mathematica* provides instant access to an expanding library of data collections, including geography, linguistics, chemistry, human genome, weather, finance, and many more. You can access these from right inside *Mathematica* and seamlessly incorporate current data in any computation or classroom example.

Current and historical financial data on stocks, funds, indices, and currencies—in immediately computable form.
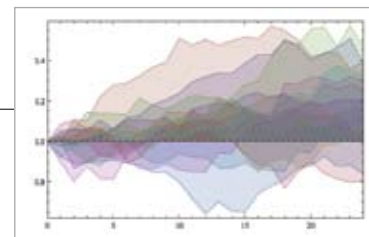
Extensive data on all standard human proteins, including built-in 3D protein structure data and visualization.
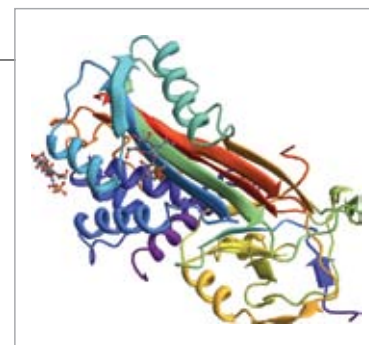
Over 150 economic, demographic, geographic, and other properties of countries and country groups.

> wolfram.com/screencasts/integrateddata

## BUILT-IN IMAGE PROCESSING & ANALYSIS

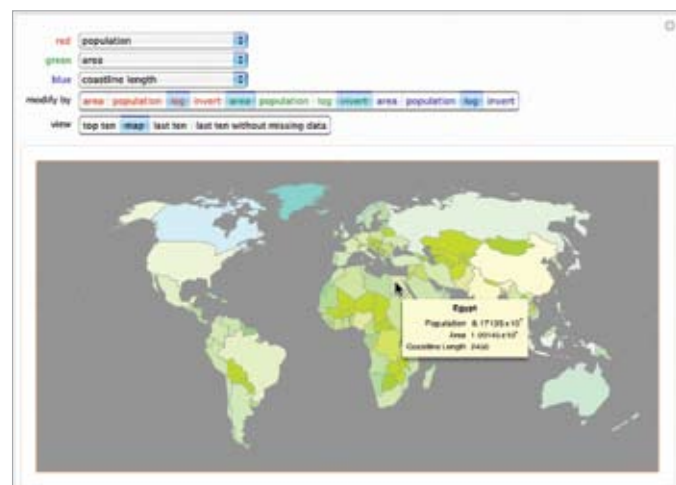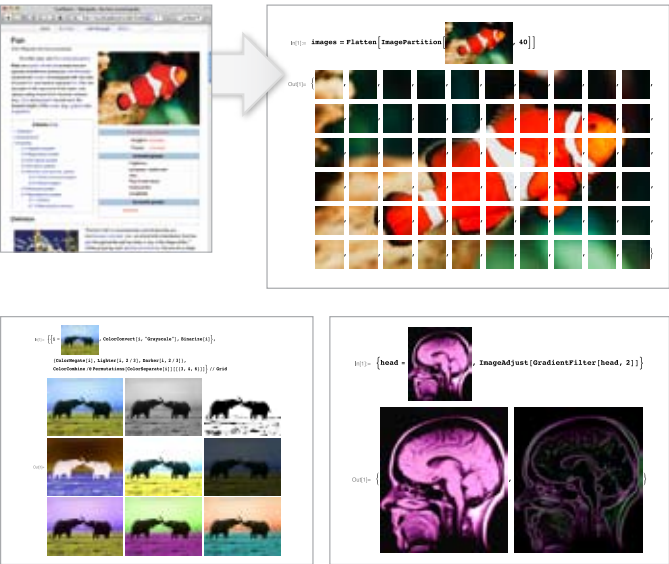The image processing environment of *Mathematica* was designed from the ground up to become the system of choice for imaging research and applications in science, engineering, medicine, and education. Industrial-strength, high-performance functions for image composition, transformation, enhancement, and segmentation combine with the existing *Mathematica* infrastructure to make a uniquely versatile image processing solution.

Simply drag and drop image files into your notebook to begin manipulating the image.

Import graphics into your existing *Mathematica* program code to process image data using hundreds of existing built-in functions, then share your results right within *Mathematica*.

➜ wolfram.com/screencasts/imageprocessing

## BUILT-IN PARALLEL COMPUTING

Parallel computing is no longer just for experts. Every copy of *Mathematica* comes standard with the technology to parallelize computations over multiple cores or over networks of *Mathematica* deployed across a grid. With zero configuration, *Mathematica* automatically runs multiple parts of a computation concurrently—and makes parallel computing easy enough that it can be used in seconds as a routine part of everyday work.

*Mathematica* supports speculative parallelism by trying different computations in parallel and giving the first result obtained.

| Method | Minimum | |
|---|---|---|
| Newton | −2.92917 | Speculative Result |
| QuasiNewton | −2.46 | |
| ConjugateGradient | −2.46 | |
| InteriorPoint | 63.2173 | |
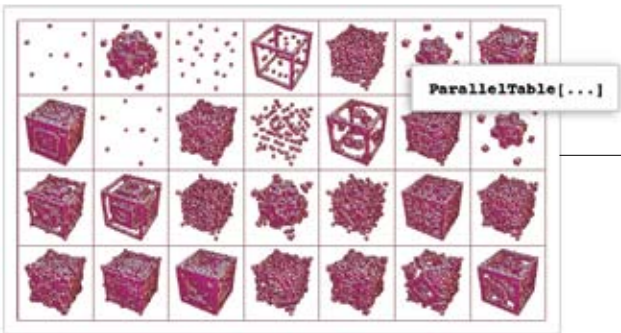
The **Parallel Kernel Status** display gives you the ability to monitor the parallel efficiency of your computations.

Automatically distribute different evaluations among different processors to create tables of results in parallel.

➜ wolfram.com/screencasts/parallelcomputing

Here is your chance to begin to explore *Mathematica* for yourself.
Try the following basic calculations in your license of *Mathematica*.

## First Calculations

In[1]:= `2 + 2`

Out[1]= `4`

In[2]:= `N[Pi, 150]`

After you type your expression, press SHIFT + ENTER to evaluate.

In[3]:= $\text{Det}\left[\begin{pmatrix} 2.0 & 3.1 \\ 0.2 & -0.29 \end{pmatrix}\right]$

In[4]:= `Solve[a x`$^2$` + b x + c == 0, x]`

Functions start with capital letters, and arguments are surrounded by square brackets.

In[5]:= `Plot[Sin[2 x], {x, -2 `$\pi$`, 2 `$\pi$`}]`

In[6]:= $\int (a^2 + 2a + 1) \, da$

The **Classroom Assistant** palette can be used to typeset your expressions.

In[7]:= `ContourPlot[Sin[a b], {a, 1, 3}, {b, 1, 3}]`

In[8]:= `Manipulate[Factor[x`$^n$` + y`$^n$`], {n, 1, 50, 1}]`

In[9]:= `Manipulate[Plot3D[Sin[x + y + c], {x, 0, 6},` `{y, 0, 6}], {c, 1, 5}]`

Lists or ranges are represented by curly braces.

In[10]:= `ChemicalData["Caffeine", "MoleculePlot"]`

In[11]:= `GenomeLookup["GAACTACAGACCAGA"]`

In[12]:= $\text{Parallelize}\left[\sum_{i=1}^{250} i!\right]$

If you can do these calculations, you will be ready to integrate *Mathematica* within your own classroom!

## A TOOL FOR A LIFETIME

*Mathematica* is used at virtually every university and institution of higher education around the world. In fact, thousands of universities in 54 countries have signed campus agreements with Wolfram Research.

With recent versions of *Mathematica*, however, users of *Mathematica* have expanded greatly and vary in age from 9 to 90. From young students learning in the classroom to serious research using some of the world's largest clusters, the scope and breadth of *Mathematica* has now revolutionized the cross-discipline approach to integrating software into educational curricula.

### QUICK FACTS

- 100% of the world's 200 top-ranked universities are using *Mathematica* and over 90% have organization site licenses.

- 43 of the top 50 liberal arts colleges in the United States have site-licensed *Mathematica* for integration in courses.

- Thousands of schools worldwide use *Mathematica* in their classrooms, including the #1 ranked U.S. high school.

- *Mathematica* is present in Fortune 500 companies, government research labs, universities, high schools, and homes, on all seven continents and beyond.

## LICENSING *MATHEMATICA*

Wolfram Research's licensing programs offer the most economical and easy-to-administer options for equipping your office, classroom, and campus with *Mathematica* technology.

For over 20 years, we have worked with educational institutions to provide solutions for curricula and research.

Our flexible licensing programs are backed by top-notch technical support and provide large discounts off list prices, with lower starting costs and more benefits than ever before:

- Free upgrades
- Free technical support
- Free additional home-use licenses for faculty and staff
- Student home-use solutions available

## FIND OUT MORE

Contact us today to discuss what licensing benefits you already have available and/or what new options will work best for you and your students.

We will help you mix and match from all eligible Wolfram products to build the optimal solution for your organization.

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+44-(0)1993-883400

wolfram.com/academicpurchase.html

# EXPLORE OUR ONLINE RESOURCES

**VIEW THE QUICK OVERVIEW**

A short slide show provides an instant look at the features and functions of *Mathematica*.
wolfram.com/mathematica

**WATCH A VIDEO SCREENCAST**

Brief screencasts show you how to incorporate *Mathematica* into your everyday tasks immediately.
wolfram.com/screencasts

**FIND A *MATHEMATICA*-RELATED BOOK**

The latest *Mathematica*-related books, covering topics as diverse as programming, art, engineering, finance, computer science, and much more.
wolfram.com/books

**ATTEND A FREE SEMINAR**

Free online seminars led by senior Wolfram Research technical staff provide live answers to your questions.
wolfram.com/seminars

**FIND INSTRUCTIONS IN OUR "HOW TOS"**

"How tos" give simple step-by-step instructions to solve specific problems in *Mathematica*.
reference.wolfram.com/howtos

**READ ONE OF OUR TUTORIALS**

Tutorials provide in-depth instruction on using *Mathematica* and how it pertains to your work.
wolfram.com/tutorialcollection

**OTHER WEB RESOURCES**

- Access full *Mathematica* documentation at reference.wolfram.com
- Explore the web's most popular and extensive mathematics resource at mathworld.wolfram.com

→ wolfram.com/screencasts/utilizingresources