

Mathematical Moments— Exciting Applications of Mathematics!

A series of more than 80 posters that describe the role mathematics plays in science, nature, technology, and human culture. Inside are Moments on using math to

- Create 3D movies
- Make health care more efficient
- Expose election fraud and human rights abuses
- Save energy in buildings
- Determine each state's representation in the U.S. House
- Understand rogue waves
- Compressively sample images



Listen Up! — Podcast Interviews with Experts

Walter Craig, McMaster University

Patrick Ball, Benetech

Emmanuel Candès, Stanford University

Jennifer Wilson, The New School for Liberal Arts
and more...

Getting at the Truth

Mathematics has helped investigators in several major cases of human rights abuses and election fraud. Among them: The 2009 election in Iran. A mathematical result known as Benford's law predicted the leading digits of the Iranian election results were distributed very differently than might be expected. Instead, smaller digits, such as 1's, appear much more frequently than they should. Statistical tests based on Benford and other statistical tests have been applied to the 2009 election and suggest strongly that the final totals are suspicious.

Electoral fraud in Iran, most notably in the 2009 election, claimed that the mass killing of ethnic Albanians from Kosovo was due to NATO. However, the mathematical analysis of the activities of the Albanian Kosovars showed they moved further than anything he had ordered. A team of mathematicians then flew to the refugees to test those conclusions and find out what was really going on in Iran.

The Mathematical Moments program processes grants to support the production of posters that highlight the important role mathematics plays in science, nature, technology, and human culture.
www.ams.org/mathmoments

Adding Depth

The substantial use of digital technology in films has landed mathematics a leading role (unprecedented) in many recent hits. That role is now expanding as directors and animators look beyond the three-dimensional screen to help introduce another dimension to the two-dimensional screen. The images you see are created using geometry, linear algebra, partial differential equations, and vector analysis. Computer algorithms employ ideas from these and other areas to depict the effects of light on objects, such as the caustic-like images of hair, water, and skin—even when it's blue.

The Mathematical Moments program processes grants to support the production of posters that highlight the important role mathematics plays in science, nature, technology, and human culture.
www.ams.org/mathmoments

Knowing Rogues

It doesn't take a perfect storm to generate a rogue wave—an open-ocean wave much steeper and more massive than its neighbors that appears with little or no warning. Sometimes waves interact with each other in a way that amplifies them non-linearly and produces these towering walls of water. Mathematicians have developed a theory that can predict when waves will interact and form rogue waves and modeling them with partial differential equations to understand how and why they form. A deeper understanding of these waves can help prevent damage and loss in shipping and offshore platform operations.

The Mathematical Moments program processes grants to support the production of posters that highlight the important role mathematics plays in science, nature, technology, and human culture.
www.ams.org/mathmoments

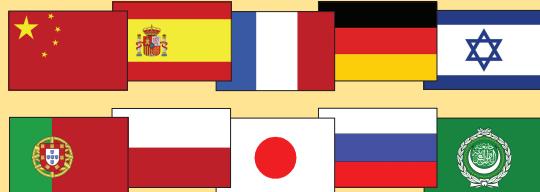
Assigning Seats

As difficult as it is to do the census, the ensuing process of determining the number of congressional seats for each state can be even harder. The problem is, that the proportion of each state's population to the House of Representatives, the proportion of the U.S. population, is simple enough. The difficulty arises when the House of Representatives must be reasonably representative (e.g., New York can't have 287 seats). Over the past 200 years, several methods of apportioning seats have been used. The most recent method, the Huntington-Hill method, resulted in a paradoxical situation: a small increase in the total number of House seats actually resulted in a reduction of seats for some states. The method used since the 1940s, which is the method used today, is one that avoids such paradoxes.

The Mathematical Moments program processes grants to support the production of posters that highlight the important role mathematics plays in science, nature, technology, and human culture.
www.ams.org/mathmoments

Mathematical Moments in Other Languages

Read translated versions in Chinese, Spanish, French, German, Greek, Hebrew, Portuguese, Polish, Japanese, Russian, and Arabic.



Using Mathematical Moments

- Display in your office
- Use in the classroom
- Distribute at special events
- Post on bulletin boards

www.ams.org/mathmoments

