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**ZAKIM BRIDGE POSTER!**



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# MATHCOUNTS®

Fall 2014 | Vol 35 | Issue 1

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## 32nd Competition Series Opens, 2015 Raytheon MATHCOUNTS National Competition to Take Place in Boston

### IMPORTANT DATES FOR 2014–2015

- Now** Registration open for the MATHCOUNTS Competition Series at [www.mathcounts.org/compreg](http://www.mathcounts.org/compreg)
- Nov. 3** 2015 School Competition available for download to all registered Competition Coaches
- Nov. 14** (postmarked) Deadline to register for the Competition Series at *reduced rates*
- Dec. 12** (postmarked) Deadline to register for the Competition Series. *Register on time to ensure your students' participation.*
- Jan. 31–Feb. 28** Chapter Competitions
- Mar. 1–31** State Competitions
- May 8** 2015 Raytheon MATHCOUNTS National Competition in Boston



Registration is open for the 32nd **MATHCOUNTS Competition Series**, the only middle school math program with live, in-person events in all 50 states. Created to provide new ways for bright students to engage in math and cultivate their talents, the Competition Series goes beyond typical “textbook math” and exposes students to fun, exciting, social events.

Coaches begin training their student competitors in the fall, using the free *2014–2015 MATHCOUNTS School Handbook*. Starting in December, Mathletes compete against their classmates in School Competitions, vying for the opportunity to advance to Chapter Competitions in February, and then to State Competitions in March.

The top four students from each of the 56 states and U.S. territories will progress to the **2015 Raytheon MATHCOUNTS National Competition**, which will take place in Boston, Mass. for the first time ever. The nation’s top 224 young mathematicians will compete for the title of MATHCOUNTS National Champion and the \$20,000 Donald G. Weinert Scholarship.

“We’re thrilled to bring the National Competition to Boston,” said MATHCOUNTS executive director Lou DiGioia. “Raytheon has been the Title Sponsor of the Competition Series since 2009, so being in the city where they are headquartered is especially meaningful for us.” The event will take place May 8, 2015 at the Sheraton Boston Hotel.

Look throughout this newsletter for some Boston landmarks and famous sites—from the Freedom Trail to the Museum of Science! More information about the MATHCOUNTS Competition Series can be found at [www.mathcounts.org/competition](http://www.mathcounts.org/competition).

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# Materials, Activities Expanded for The National Math Club

## IMPORTANT DATES FOR 2014–2015

- Now** Registration open for The National Math Club at [www.mathcounts.org/clubreg](http://www.mathcounts.org/clubreg)
- Mar. 6** (received) Silver Level Deadline to be eligible for all awards, as well as entry into the Silver Level Drawing
- Apr. 3** (received) Gold Level Deadline to be eligible for all awards, as well as entry into the Gold Level Drawing and Grand Prize Drawing
- Apr. 24** Silver, Gold + Grand Prize Drawing winners announced on MATHCOUNTS website
- May 8** Club Leader + 4 students from Grand Prize winning club attend 2015 Raytheon MATHCOUNTS National Competition in Boston
- May 29** (received) Final Silver + Gold Level Deadline. No applications or projects accepted after May 29th. Awards available while supplies last.



MATHCOUNTS added to the resources provided to educators through **The National Math Club**—a free program designed to engage students in fun, hands-on math in a relaxed, social setting. This year's program resources for teachers include an extended-length *Club Activity Book*, as well as over 100 activity plans and math challenges accessible to club leaders online.

This year's increase in club resources follows the 2013 expansion of the program's eligibility requirements, which helped bring The National Math Club to hundreds more classrooms, extracurricular groups and community organizations. Multiple teachers from within the same school, as well as non-school groups are eligible to participate.

In addition to providing more materials this year, the **2014–2015 Club Activity Book** also has been restructured to help club leaders choose the activities that will work best for their students. New material has been added to some of the highest-rated past activities, so that clubs can play their favorite games and puzzles again and again. In addition, MATHCOUNTS created a detailed catalog of all past and current club activities, so that club leaders can more easily identify the materials and plans that they need for their club meetings.

The 2014–2015 National Math Club is sponsored by the Northrop Grumman Foundation. Registration is completely free. More information is available at [www.mathcounts.org/club](http://www.mathcounts.org/club).

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## MATHCOUNTS Shortens Math Video Challenge Registration Process

Participants in this year's **Math Video Challenge** will find it easier to complete the registration process, with the number of steps being cut in half. The changes to the online registration system came in response to feedback from last year's team advisors and participants.



Math Video Challenge teams create a video solution to a problem from the 2014–2015 MATHCOUNTS School Handbook that also shows the real-world application of the math concept used in the problem. Teams post their videos to the contest website, where general public voting determines the 100 videos to advance to the judging rounds. Twenty semifinalist videos, and then later, four finalist videos, are selected. Finalists present their videos at the Math Video Challenge Finals at the 2015 Raytheon MATHCOUNTS National Competition, where the national competitors will vote to determine the winner.



This year MATHCOUNTS created new resources to help teams complete their videos. Tools include: an online resource to help teams find approved music for their videos, a streamlined video uploading portal and the **2014–2015 Quick Start Guide**.

Registration and additional information about the Math Video Challenge are available at [videochallenge.mathcounts.org](http://videochallenge.mathcounts.org).

## IMPORTANT DATES FOR 2014–2015

- Now** Registration + video submission open for the Math Video Challenge at [videochallenge.mathcounts.org](http://videochallenge.mathcounts.org)
- Feb. 2** Last day to submit videos before voting begins. *Get your video submitted by this day to have the most time to collect votes.*
- Feb. 3** Voting open to the general public
- Mar. 13** General public voting closed. *Last day to get those votes!*
- Mar. 16** Top 100 videos advance to first round of Judges Panel review
- Mar. 27** 20 Semifinalist videos announced
- Apr. 3** 4 Finalist videos announced
- May 9** Finalists present their videos at the 2015 Math Video Challenge Finals in Boston

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## IMPORTANT DATES FOR 2014–2015

- Now** Sign-up open for Solve-A-Thon at [solveathon.mathcounts.org](http://solveathon.mathcounts.org)
- Apr. 30** Deadline for Top Earning School + Top Earning Student awards. *Fundraisers can go on any time during the year.*

## MATHCOUNTS Kicks Off 2nd Annual Solve-A-Thon

The second year of the **MATHCOUNTS Solve-A-Thon** opened this fall. A unique fundraiser that empowers schools to fundraise using math, Solve-A-Thon is designed to be teacher-friendly: it requires little set-up time, can be done completely online and challenges students to solve math problems in order to reach their fundraising goals.

Last year Solve-A-Thon helped students and educators across the country raise nearly \$13,000 and earn thousands of dollars in prizes. The Top Earning School last spring was Orlando Science School, winner of a set of five graphing calculators, as well as individual prizes for all participating students. The Top Earning Student, Tran Le, won an iPad Mini.



Unlike sales-based fundraisers that allocate most of the money raised by students to a for-profit company, **100%** of the money raised through Solve-A-Thon goes to math education programs that directly impact the students' local communities, with schools keeping 60% of all money raised. Best of all, student fundraisers complete math problems covering topics from the **Grades 6–8 Standards of the National Council of Teachers of Mathematics**, so they can boost their problem solving skills while earning money for their school's math program at the same time.

Information and sign-up are available at [solveathon.mathcounts.org](http://solveathon.mathcounts.org).



# MATHCOUNTS Announces New Alumni Engagement Initiatives

Alumni are a critical part of the MATHCOUNTS community. Not only do they go on to make a difference in the world, they also inspire the next generation of problem solvers and leaders. This makes alumni engagement so important, and in the past two years MATHCOUNTS has made connecting with and supporting alumni a priority. We are just getting started and will continue to create new ways to help empower MATHCOUNTS alumni to continue their education, network and give back.

**2015 MATHCOUNTS ALUMNI SCHOLARSHIP:** The 2015 application and instructions for the \$3,000 MATHCOUNTS Alumni Scholarship will be posted December 1, 2014. All MATHCOUNTS alumni who are currently seniors in high school or students enrolled at a two- or four-year accredited college or university are eligible to apply. Learn more and get the application at [www.mathcounts.org/scholarship](http://www.mathcounts.org/scholarship).

**THE ALUMNI SPOTLIGHT PROJECT:** The Alumni Spotlight Project was created this year as a new way to feature profiles of MATHCOUNTS alumni who have gone on to do incredible things in high school and beyond. The project will be updated with new profiles every month at [www.mathcounts.org/asp](http://www.mathcounts.org/asp).

**MATHCOUNTS FOUNDATION ON INSTAGRAM:** Members of the MATHCOUNTS community now can follow [@mathcountsfoundation](https://www.instagram.com/mathcountsfoundation) on Instagram. Tag us in your #MATHCOUNTS photos, post a #TBT #ThrowBackThursday from your time as a middle school #Mathlete and check out photos from our events!

**SPONSOR A TITLE I SCHOOL IN THE MATHCOUNTS COMPETITION SERIES:** Every year MATHCOUNTS covers half of the registration fees for thousands of students from Title I schools. This December 2nd, help MATHCOUNTS reach our #GivingTuesday goal of **\$15,000** so we can sponsor the first 1,000 Mathletes from these schools and ensure more students participate.

- Sponsor a **student** from a Title I school for **\$15** • Sponsor a **team** from a Title I school for **\$50**
- Sponsor the whole registration for a Title I **school** for **\$150** • [www.mathcounts.org/donate](http://www.mathcounts.org/donate)
- Post your own **#unselfie** to spread the word about #MATHCOUNTS and our #GivingTuesday goal!

**We know our alumni go on to do incredible things, and we want to hear about them!** If you would like to share a major accomplishment of an amazing MATHCOUNTS alumnus/a, please call us at (703) 299-9006 or send an email to [info@mathcounts.org](mailto:info@mathcounts.org).

**\$15** can sponsor a Mathlete from a Title I school in your area

#GivingTuesday  
**12.2.14**

Make a donation and then help us spread the word!

Post an "unselfie" to show your support for MATHCOUNTS  
#unselfie #GivingTuesday



[www.mathcounts.org/donate](http://www.mathcounts.org/donate)

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## U.S. Team with All Former MATHCOUNTS National Competitors Wins 2nd Place in 55th International Math Olympiad

Imagine taking a test with just six problems that cover topics one might encounter in a typical high school math class—number theory, algebra, geometry, combinatorics. Imagine having nine hours split across two days to complete those six problems...

For someone not familiar with the International Mathematical Olympiad (IMO), the exam might sound straightforward—even easy. But the IMO is (in)famous for having questions that seem simple at first glance, and that in reality require exceptional skill to solve. High school students who competed at the 2014 IMO on July 8–9 in Cape Town, South Africa were confronted with complex problems, including:

*Let  $n \geq 2$  be an integer. Consider an  $n \times n$  chessboard consisting of  $n^2$  unit squares. A configuration of  $n$  rooks on this board is peaceful if every row and every column contains exactly one rook. Find the greatest positive integer  $k$  such that, for each peaceful configuration of  $n$  rooks, there is a  $k \times k$  square which does not contain a rook on any of its  $k^2$  unit squares. (Problem #2)*

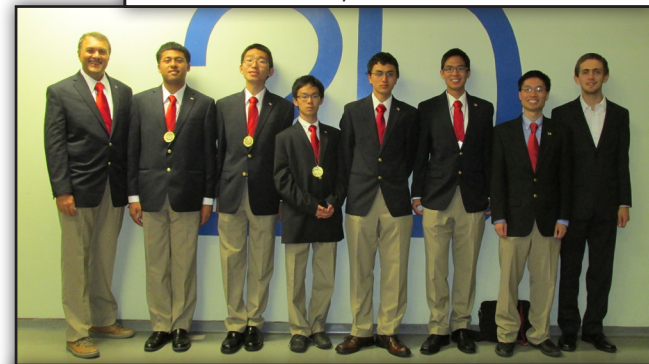
The U.S. team won second place, with competitors earning a remarkable five gold medals and one silver medal! All six team members, as well as their coach, **Po-Shen Loh**, are former MATHCOUNTS national competitors. "We are incredibly proud of these Mathletes," said MATHCOUNTS executive director Lou DiGioia. "It takes a tremendous amount of hard work and preparation even to qualify for the IMO, let alone win second place."

Loh, a math professor at Carnegie Mellon University, is also the Co-Founder of Expii, Inc., an Official Sponsor of MATHCOUNTS. Expii is building a one-stop destination for truly engaging, exciting and interactive expositions. It adopts the Wikipedia approach, empowering everyone to create rich, interactive content on an open platform, and share their love for math and science with the world.


"MATHCOUNTS introduced the fun side of math to many of us at Expii, and we now seek to magnify that impact through the Internet," explains Loh. "We're uniting math and science enthusiasts worldwide to share our collective insights on how best to motivate and explain, so that many more people can come to enjoy these subjects. We're thrilled to be able to support this community by sponsoring MATHCOUNTS!" Learn more about Expii and join their global community at [www.expii.com](http://www.expii.com).



Team members (from left) Joshua Brakensiek, James Tao, Yang Liu, Mark Sellke, Sammy Luo and Allen Liu in Cape Town, South Africa.



Razvan Gelca, Deputy Leader of the 2013 USA IMO Team (far left) and John Berman, an Observer assisting the 2014 USA IMO Team (far right) pose with Yang Liu, Sammy Luo, Allen Liu, Mark Sellke, James Tao and coach Po-Shen Loh at the IMO Closing Ceremony.

|   |   |   |  |  |   |   |
|---|---|---|--|--|---|---|
| <p><b>Po-Shen Loh</b><br/>NAT 1995–1996<br/>Pittsburgh, PA</p>  <p>Coach</p> | <p><b>Joshua Brakensiek</b><br/>NAT 2008–2010<br/>Chandler, AZ</p>  <p>S</p> | <p><b>Allen Liu</b><br/>NAT 2010–2012<br/>Penfield, NY</p>  <p>G</p> | <p><b>Yang Liu</b><br/>NAT 2010–2011<br/>St. Louis, MO</p>  <p>G</p> | <p><b>Sammy Luo</b><br/>NAT 2010<br/>Durham, NC</p>  <p>G</p> | <p><b>Mark Sellke</b><br/>NAT 2008–2010<br/>West Lafayette, IN</p>  <p>G</p> | <p><b>James Tao</b><br/>NAT 2009–2010<br/>Aurora, IL</p>  <p>G</p> |
|---|---|---|--|--|---|---|

The 2014 USA IMO team during their **MATHCOUNTS** days!



# MATHCOUNTS Poster Solution

It's not always easy computing by day and rocking audiences at sold-out concerts by night, but Feedbag is determined to be the best heavy math band around. We hope by now you already have bought your Feedbag concert tickets and solved the band's latest musical math problem! If you missed this poster, you can download it from the MATHCOUNTS website, along with the 2014–2015 MATHCOUNTS School Handbook.



**SOLUTION:** We can think of a 5-note sequence as a 5-letter sequence. This problem is made more difficult because of the 2 **E**s in **FEEDBAG**.

One way to come up with the number of sequences is to examine the various cases. Each possible 5-letter sequence will include 0, 1 or 2 **E**s.

**Case 1:** The only set of 5 letters that does not contain the letter **E** is **FDBAG**. But since these 5 letters can be arranged in  $5! = 120$  different orders, there are 120 different sequences consisting of these 5 letters.

**Case 2:** There are five combinations of 5 letters that contain 1 **E**. They are **FEDBA**, **FEDBG**, **FEBAE**, **EDBAE** and **FEDA**. Again, each of these 5-letter combinations can be arranged in  $5! = 120$  different orders resulting in  $5 \times 120 = 600$  different sequences.

**Case 3:** Finally, there are 10 combinations of 5 letters that contain 2 **E**s. They are **FEEDB**, **FEEDA**, **FEEDG**, **FEEBA**, **FEEBG**, **FEEAG**, **EEDBA**, **EEDBG**, **EEDA** and **EEBA**. Since 2 letters are the same in each of these 5-letter combinations, there are  $5! \div 2 = 120 \div 2 = 60$  different sequences of each 5-letter combination. That's  $10 \times 60 = 600$  different sequences.

Thus, the total number of different 5-letter sequences is  $120 + 600 + 600 = 1320$  sequences.

Another way to think about this problem is to consider that the number of ways to arrange 5 of 7 objects is  ${}_7P_5 = 7! \div 2! = 2520$  ways. But since the 2 **E**s in **FEEDBAG** are indistinguishable, this total figure counts the 600 sequences with 1 **E** twice. Similarly, this total figure counts the 600 sequences with 2 **E**s twice. Thus, the number of different 5-letter sequences is  $2520 - 600 - 600 = 1320$  sequences.

You can find the solution to the Zakim Bridge poster, along with an archive of more than 10 years worth of MATHCOUNTS posters and solutions at [www.mathcounts.org/poster](http://www.mathcounts.org/poster).

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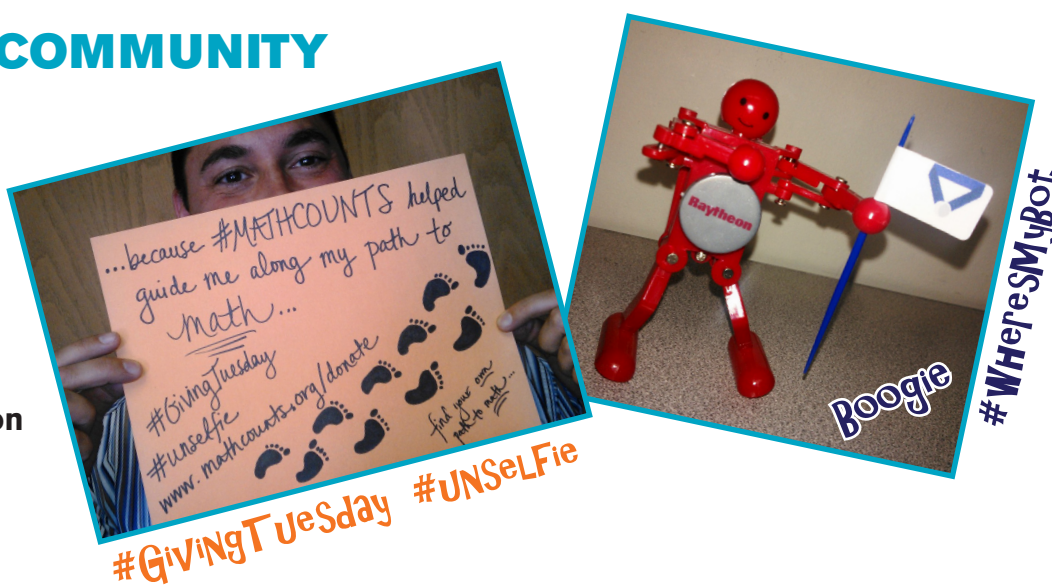
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- mathcountsfdn



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**#GivingTuesday 12.2.14**

There are many paths to math. With your help, we can ensure all students discover theirs.

[mathcounts.org/donate](http://mathcounts.org/donate)

Follow the adventures of Boogie + support Mathletes by posting your own #unselfie!



At the exact moment Alejandro began to cross the **1432-ft Zakim Bridge** from one end, cycling **28 ft/s**, Bindi began to cross, running **12 ft/s** from the opposite end. How much farther than Bindi had Alejandro traveled when they met?



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