Math League News

■ Our Calculator Rule Our contests allow both the TI-89 and HP-48. You may use any calculator without a QWERTY keyboard.

■ Send Your Comments to comments@mathleague.com. View results at www.themathleague.com before they arrive in the mail.

■ Upcoming Contest Dates & Rescheduling Contests Future HS contest dates (and alternate dates), all Tuesdays, are Jan 12 (19), Feb 9 (16), & Mar 15 (22). (Each alternate date is the following Tuesday.) If vacations, school closings, or special testing days interfere, please reschedule the contest. Attach a brief explanation, or scores may be considered unofficial. We sponsor an *Algebra Course I Contest* in April, and contests for grades 4, 5, 6, 7, and 8. Get information and sample contests at *www.themathleague.com*.

■ Contest Dates for 2016-2017 and Alternate Dates: HS contest dates for the next school year (and alternate dates), all Tuesdays, are October 18, 2016 (October 25), November 15, 2016 (November 22), December 13, 2016 (December 20), January 10, 2017 (January 17), February 7, 2017 (February 14), and March 14, 2017 (March 21). Please note that each alternate date is the Tuesday **following** the official date!

■ T-Shirts Anyone? We're often asked, "are T-shirts available? The logo lets us recognize fellow competitors!" Good news — we have MATH T-shirts in a variety of sizes at a **very** low price. Use them as prizes for high or even perfect scores, or just to foster a sense of team spirit! The shirts are of grey material and feature a small, dark blue logo in the "alligator region." A photo of the shirt is available at our website. There's one low shipping charge per order, regardless of order size. To order, use our website, www.themathleague.com.

■ Contests for iPads and iPhones We have iPad/iPhone versions of ALL of our prior contests for grades 4, 5, 6, 7, and 8 and the Algebra contests available now, including last year's contests. We are not sure when high school contests will be available, but we are working on it! The link to these iPad/iPhone applications is on the home page of our website, www.mathleague.com. Take note of our current special offer: access to **all** past contests at any selected grade level for **all** students at a given school for the low, low price of only $9.95 for the year!

■ Administer This Year's Contests Online Any school that is registered for any of our contests for the 2015-2016 school year may now register at www.online.mathleague.com for the 2015-2016 Online Contests at no cost. The advantages of administering the online versions of our contests rather than the paper and pencil ones are that you do not have to grade your students' papers and that you do not have to submit any scores at our Score Report Center ~ these tasks are done automatically for you when your students take our contests online. If you decide to use this free service, you must set up your account and set the day you are going to administer each contest at least one day in advance of the actual contest date.

■ Students Hungry for More? Don't forget, we do offer the *Algebra Course 1 Contest* in April!

Statistics / Contest #3

Prob #, % Correct (*all reported scores*)

3-1	87%	3-4	79%
3-2	81%	3-5	55%
3-3	75%	3-6	26%

■ General Comments About Contest #3: Henry Valencia said, "Thanks again for giving us the chance of playing with such nice problems!" Abdulkerim Akyalcin said, "This set of problems was much easier than the previous two. Thank you." Chip Rollinson said, "This appeared to be the easiest batch of questions in a while which is not a bad thing. I only wish the October contest was the easiest in order to not scare too many students away." Peter Knapp said, "This was much too easy this month! I assume there will be a long long list of perfect scores. Only #6 took substantial analysis, and even that could be quickly solved by using the table on a graphing calculator!" Chuck Garner appealed on Question 3-4, but said, "Otherwise, this was a great batch of problems!" David Hoffman said, "Thank you once again, mathmaster! The monthly competitions have been the events that have enabled our school to form its first math club - it really has generated a good buzz. The week after competition, we meet, go over different solutions to the previous weeks problems, and have pizza. The following two weeks we prepare for the next competition by trying problems from your workbooks - and we eat pizza. Have a happy holiday season."

■ Question 3-4: Appeal (Denied) Chuck Garner appealed on behalf of students submitting an answer of 30 degrees. They got that answer by orienting the triangles so that all 12 triangles had their vertex angles at the common point. The question does specify, however, that the triangles share a common vertex "as shown," thus ruling out any orientation other than the one represented in the diagram. The appeal is therefore denied.

■ Question 3-5: Alternate Solution and Comment Jeff Marsh suggested an alternate calculator solution, graphing both the constant and the variable expressions and finding the point of intersection. David Hoffman said, "The question with multiple radicals made my students unnecessarily irrational. Sorry, no more pun ishment."

■ Question 3-6: Appeal (Denied), Comments, and Alternate Solutions Kaleen Graessle appealed on behalf of students who answered (576, 13824), giving (m,n) instead of m. Unfortunately this answer is not an appropriate response to the question asked, so credit cannot be given and the appeal is denied. Jeff Brock said, "Problem 6 was hard if you tried to solve it analytically, but the kids who just calculator-bashed it got it very quickly." Rob Peven and Chip Rollinson also mentioned calculator approaches. Rob Peven said, "An alternative solution, using the table feature on the TI-84, is to enter $y = (x^3 + x^2)^{0.5}$ and then to scroll through the table starting at $x = 32$ (approx. square root of 1000) looking for a y value that is an integer. It doesn't take long to see that $x = 24$ forms a perfect square." Chip Rollinson said, "#6 was definitely the most challenging for my students. I did hear about two alternate solutions from them: Alternate Solution #1: In order for m and n to be integers and for $m^3 = n^2$ then m must be a perfect square and n must be a perfect cube. In other words, $m = a^2$ and $n = a^3$. Substituting, $m + n$ becomes $a^2 + a^3$ which factors to $a^2(1 + a)$. In order for this product to be a perfect square, $1 + a$ must be a perfect square (since a^2 is obviously a perfect square). This means that a must be one less than a perfect square. This limits the choices for a quite a bit! a =3, 8, 15, 24, 35, 48, 63... Since $m = a^2$, then m = 9, 16, 225, 576, 1225... You can stop there. 576 is the largest value of m that is less than 1000! Alternate Solution #2: Brute force it with your calculator. If $m^3=n^2$, then $n=m^{3/2}$. Therefore to check if $m + n$ is perfect square, check if sqrt($m + n$) is an integer...or (after substitution) if sqrt($m+n^{1.5}$) is an integer. Let $f(x)$ = sqrt($x + x^{1.5}$), then scroll through a table of values for $x = 1$ through $x = 1000$. You'll find that $x = 576$ is the largest value that works (the smaller values are 9, 64, and 225... the squares of values of a from the previous solution)."