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.

■ Our Internet Score Center All students whose scores you report must have been tested at exactly the same time. Don't list students from any later class period. Instructions for submitting scores appear on each contest envelope. Scores you enter may be reviewed at any time by returning to the Internet Score Center. About 3 weeks after a contest, scores appear on our Web site, *www.mathleague.com.* Late scores must be accompanied by a brief explanation of the reason for lateness.

■ Administer This Year's Contests Online Any school that is registered for any of our contests for the 2014-2015 school year may now register at http://online.mathleague.com for the 2014-2015 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.

■ Past Contests Online Teachers of any school registered for any of our 2014-2015 contests can now purchase online versions of the past contests for any selected grade (4th Grade through High School) for $9.95 per grade level for use throughout this school year at http://online.mathleague.com . For this fee, all students in your school can take all the past contests for a specific grade online. We grade each contest for you, provide you with answers and solutions, and keep statistics on each student's performance.

■ Send Your Comments to comments@mathleague.com

■ We Are on Facebook! Like us at https://www.facebook.com/TheMathLeagueInc.

■ Contest Dates Future HS contest dates (and alternates), all Tuesdays, are November 11 (Nov. 18), December 9 (Dec. 16), January 13 (Jan. 20), February 10 (Feb. 17), and March 17 (Mar. 24). Please note that each alternate date is on the Tuesday **following** the official date!! The alternate date for March 17 is March 24, and not March 25 as erroneously printed. For vacations, special testing days, or other *known* disruptions of the normal school day on a contest date, please *give the contest on the following Tuesday.* If your scores are late, please submit a brief explanation. We reserve the right to refuse late scores lacking an explanation. We sponsor an *Algebra Course I Contest* in April, as well as contests for grades 4, 5, 6, 7, & 8. See *www.mathleague.com* for information.

■ Not Yet Received Your HS Contest Package? E-mail dan@mathleague.com so we can reship. If you just recently got the contests, *please take Contest #1 as soon as possible, even if it's late!*

■ Carefully Check Your Contest Package—Disregard Incorrect "2013-2014" Designation Without opening any contest envelope, please check that the remaining envelopes are numbered 2, 3, 4, 5, and 6. If you're missing a contest envelope, e-mail *dan@mathleague.com* with your name, the school's name, the full school address, and the number of the contest envelope you're missing. We'll mail you another set of contests right away. Please note that the envelopes containing the six contests have the year's schedule printed on them. <u>While the schedule is correct, the heading has the wrong year.</u> Please disregard the "2013-2014" heading.

■ Eligibility Rules Only students officially registered as students at your school may participate. That's our rule.

■ Authentication of Scores To give credibility to our results, we authenticate scores high enough to win recognition. Awards indicate compliance with our rules. Please print the Selected Math League Rules (posted on the same page as this Newsletter) and have students read them and then sign them to confirm knowledge of the rules. *Keep* the signed sheets. Do *not* send them to us unless we request authentication from you.

■ General Comments About the Contest Rob Frenchick said, "This was a really good test. There were problems for students of every ability level. That is great! We need to keep all students' interest up. Thanks." Abdulkerim Akyalcin said, "Thank you for providing these great questions." Denes Jakob said, "We enjoyed Contest #1; my students' enthusiasm and excitement were evident." Wes Loewer said, "Looks like a good first contest. Thanks again." Travis Bower said, "Thanks for another contest season." Peter Knapp said, "An odd contest. My students found #3 and #4 harder than #5 and #6!" Jeff Ulrich said, "I suggest that some of the contests should be with no calculators allowed. My guess is that the question writers have a difficult time coming up with questions that can't be easily solved with some of these newer calculators. Just a thought."

■ Question 1-3: Comment and Alternate Solutions Peter Knapp said, "though #3 had a really neat algebraic solution, several students divided both sides by 2014^{2012} and then made it a calculator bash." Denes Jakob said, "one of my students has an alternate solution: on the left side he rewrites 2013 as (2014-1) and expands and simplifies:

$2014^n+(2014-1)\text{x}2014^{2012}+(2014-1)\text{x}2014^{2013}=2014^{2014}$

$2014^n+2014^{2013}-2014^{2012}+2014^{2014}-2014^{2013} = 2014^{2014}$

$2014^n = 2014^{2012}$ and $n = 2012$." Michelle Connolly had a student who had a similar solution, except that he set $x = 2014$ and expressed all numbers in terms of x.

■ Question 1-4: Comment and Alternate Solutions Amy Pergola said, "I felt the wording for #4 made the problem very confusing. I initially thought the question was asking for the sum of the exterior angles of the figure, which were each more than 180 degrees. Clearer wording would have been 'What is the sum of the degree measures of angles A, B, C, D, and E...', omitting reference to the outer points." Chip Rollinson said, "One of my students used an elegant method for solving problem 1-4 that was different from either of your solutions, so I thought I'd share it with you. He noticed that angle 1 was an exterior angle to triangle DEJ and therefore equal to the sum of angles D and E. He also noticed that angle 2 was an exterior angle to triangle BCI and therefore equal to the sum of angles B and C. Therefore the sum of angles A, B, C, D, and E is equal to the sum of the angles of triangle AIJ - 180 degrees." Denes Jakob reported another student's alternate solution, saying, "Let's label the vertices of the pentagon close to D, M and N. Now, angle DMN is an exterior angle of triangle AMC, so by the exterior angle theorem is equal to A+C. Angle DNM is an exterior angle of triangle BNE, so is equal to B+E. Finally, in triangle DMN, using angle sum theorem, D+A+C+B+E=180." Denes Jakob also submitted another alternate solution, saying "The exterior angles at the vertices of the pentagon are opposite and congruent, so we label them a-a, b-b, c-c, d-d, e-e. Using the angle sum theorem in the outside triangles: A+a+b+B+b+c+C+c+d+D+d+e+E+e+a=5(180) A+B+C+D+E+2(a+b+c+d+e)=900 The sum of the exterior angles of any polygon is 360, so: A+B+C+D+E+2(360)=900 A+B+C+D+E=180. This can also be illustrated by taking a pencil and placing it (let's say) on line segment CE and rotating the pencil clockwise through angle C, then over angle A, then D, B, and finally E. The pencil rotated through 180 degrees." Michelle Connolly submitted yet another alternate solution based on forming 5 triangles, each of which has as vertices two of the outer points of the star and one of the vertices of the inner pentagon. The total of 900 degrees in these 5 triangles includes the 540 degrees of the pentagon and 360 degrees consisting of each of the outer points of the star counted twice. Hence, the total is 180 degrees if each of the points of the star is counted once.

■ Question 1-5: Comment and Appeal (Denied) Peter Knapp said, "Several students said that the use of a calculator made #5 too easy. They simply evaluated the left side of the equation on their calculators and raised to different powers until they got a whole number!" Douglas Coates appealed on behalf of students who wrote the answer in root form and not as an ordered pair. Since the question specified an ordered pair, credit cannot be given to answers written in any other form, and the appeal is denied.

Statistics / Contest #1

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

1-1	80%	1-4	51%
1-2	54%	1-5	53%
1-3	42%	1-6	45%