



Math League News

■ **Use the Internet to View Scores or Send Comments** to comments@mathleague.com.

■ **Contest Registration and Books of Past Contests** Register for next year by mail or on the internet right now! Renew now so you don't forget later! *You may ask us to bill you this fall.* We sponsor an *Algebra Course I Contest* and contests for grades 4, 5, 6, 7, and 8. You may register for contests or **Order Books of Past Contests** at www.mathleague.com.

■ **2010-2011 Contest Dates** We schedule the six contests to be held four weeks apart (mostly) and to end in March. Next year's contest (and alternate) dates, all Tuesdays, are Oct. 19(12), Nov. 16(9), Dec. 14(7), Jan. 11(4), Feb. 22(15), and Mar. 22(15). *Do you have a testing or other conflict?* If so, right now is a good time to put the alternate date on your calendar!

■ **End-of-Year Awards and Certificates** Symbols identify winners. We ship plaques to the advisors. Errors? E-mail corrections to dan@mathleague.com. Identify the award, contest level, your name, and the school's name and address. The envelope for Contest #5 contained Certificates of Merit for the highest scoring students overall and in each grade for the year. Do you need extra certificates for ties? If so, send a **self-addressed, stamped envelope large enough to hold certificates (you need to use *TRIPLE* postage)** to *Certificates, P.O. Box 17, Tenafly, NJ 07670-0017.* (Please allow one week.)

■ **General Comments About the Contest (and the Year)** Matthew Keating said, "In the ten years I have been in charge of Math League at our school, this contest challenged our students more than any other...Thanks for the challenging problems!" Mark Luce said, "Thank you for a challenging contest. Judging by their scores, my students found this to be the toughest contest yet. ... Already looking forward to next year's contests!" Lynette Quigley said, "This contest definitely stumped the students more than the other tests." Travis Bower said, "The drop menu of names is helpful. Thanks for another year." John Cocharo said, "This was probably the hardest set that I have seen in many years. Oh well." Sara Glodosky reflected a commonly expressed sentiment when she said, "I thought that contest questions 5 and 6 were extremely difficult." Dave Ollar said, "These have been good contests, but I think this was by far the hardest. ... I can't wait to see the other scores." Fred Harwood said, "Thank you again for this excellent format that fits into our lunch schedule. Well done." Donald Brown said, "This test seemed to go back to form ~ easiest to most difficult in order." Laura Morin said, "Thanks for a great competition. My kids LOVED it!" Richard Serrao said, "Thanks for another great year!" Anna Houben said, "This one was especially hard; the last two problems required precalc topics, and more than half of our kids aren't there yet. This should break some ties. It was a good year. Thank you for all you do." Sarah Manchester said, "Thanks ... for letting us participate in the high school math league. The kids have really enjoyed the challenge and the problems have sparked great discussions. We'll definitely be back next year." Richard Leavitt said, "Many thanks for delightful opportunities and challenges, and for excellent services." See you next year!!

■ **Question 6-1: Comment** Halyna Kopach said, "A surprising number of students this time missed question #1, which I thought was an easy question. Students invariably calculated a semi-perimeter rather than a perimeter. Had they sketched a diagram, rather than attempt the question algebraically only, this mistake should not have happened." Keith Calkins agreed, saying, "MANY students gave an answer half the correct size on question 1."

■ **Question 6-2: Comment** Keith Calkins said, "Not giving an ordered pair sabotaged MANY otherwise correct answers on question 2."

■ **Question 6-3: Comment** Fred Harwood said, "not a big fan of a true/false style answer on this test like 6-3." Mark Dickson agreed with that idea, saying, "6-3 should be redesigned so that students don't have a 50% chance of getting it right by guessing."

■ **Question 6-4: Comment and Appeals (denied)** Mark Dickson said, "6-4 can be done on a TI-89 with no effort." Keith Calkins said, "Only 8 of my students got question 4, but at least four more failed to put the answer in the correct (remainder as polynomial) format, instead expressing it as a fraction." Keith wasn't the only advisor faced with an answer in the form of a fraction for this question: Mike Kraemer, Benjamin Dillon, and Matt Beekin all appealed on behalf of answers in fractional form. Benjamin Dillon said, "Aside from the fact that this answer shows clear knowledge, many students have been taught to write the remainder inside a rational expression so as to take limits to find end behavior. Also, having taken [Math League contests] for years, I know that answers with expressions have been *extremely* rare, so when and why did The Mathematics League move to increasing the prevalence of these problems?" Matt Beekin said "I am going with the assumption that this will not be accepted, but if you want to grant it out of benevolence, I will gladly award the one extra point to my team. I had a student who correctly performed all the division and gave the answer $(2x + 1)/(x^2 + 1)$. I am assuming that this is incorrect since it does not fit the definition of remainder. What a shame, too; the same student correctly figured a problem on an earlier contest and gave the answer 1 hour when the answer that needed to be given was 60 minutes. I warn them before every contest to make sure they give their answer in the exact form asked for, but they still forget sometimes." Yes, Matt, you are correct. The answer cannot receive credit if it is not in the form of a polynomial.

■ **Question 6-5: Comment** Mark Luce said, "I didn't think problem five was that hard, but none of my students seemed to consider the possibility of a negative ratio." Mark Keating said, "I liked question 5, but was disappointed that none of our students solved it!" Many of our advisors commented on the difficulty of this question, and of course the statistical results prove them correct.

■ **Question 6-6: Comment and Alternate Solutions** Many advisors commented on the difficulty of this question as well, with more than one observing that none of their students were able to solve it. Sarah Manchester submitted an alternate solution that uses the same triangles drawn in our solution, but cleverly avoids the need to use the law of cosines by instead using Heron's Formula for the area of a triangle. She says, "The large triangle in your diagram is divided into two triangles with the same height. Since the base of the left triangle is 2 and the base of the other triangle is 1, the left triangle has double the area. Thus, I set up an equation using Heron's formula. This works beautifully, since both triangles have a semi-perimeter of 3:

$$\sqrt{(3)(1)(2-r)(r)} = 2\sqrt{(3)(2)(r)(1-r)}$$

Cancel the $3r$ under the radicals, square both sides, and finish solving to get $r = 6/7$." Mike Jantz had a student, James Kim, who also used Heron's formula to solve in a similar way. Erick Lee had an alternate solution similar to the one on the official solution sheet, but a little more elegant. He said, "One student correctly solved this question by making the same triangle picture as on the solution sheet but making θ the angle on the circle with radius 1. Then two equations can be made using the law of cosines with θ . Simplifying this system of equations gives $r = 6/7$. This solution is somewhat less complex since there is no need to use supplementary angles and $\cos(180^\circ - \theta) = -\cos(\theta)$ to solve the equation."

Statistics / Contest #6

Prob #, % Correct (all reported scores)

6-1	71%	6-4	20%
6-2	94%	6-5	7%
6-3	80%	6-6	3%