



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. Use the registration form enclosed with Contest #6 to register for contests or to **Order Books of Past Contests**.

■ **2015-2016 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 October 13 (Oct. 20), November 10 (Nov. 17), December 8 (Dec. 15), January 12 (Jan. 19), February 9 (Feb. 16), and March 15 (Mar. 22). *Do you have a testing or other conflict?* If so, right now is a good time to put the alternate date on your calendar!

■ **Test Security Procedures** Students are expected to sign the honor pledge posted on our website, affirming that they "will neither give nor receive help with any of the Math League Contest questions either before or during any of the Math League Contests." Of course, in the end contest security is really a cooperative effort. Schools should do whatever they can to prevent premature disclosure of questions and/or answers. For our part, we are always monitoring the results for any suspicious outcomes, which we then investigate thoroughly.

■ **End-of-Year Awards and Certificates** Symbols identify winners. We ship plaques to the advisors. Errors? Write to *Math Plaques*, P.O. Box 17, Tenafly, NJ 07670-0017. 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)** Otilie Valverde said, "Thank you for your continued work to provide this Contest. Some of our students are anxious to do well and look forward to hearing the results and answers when we post them a day or two after the contest. Yesterday, when one student found he had gotten all six questions and that he was our school winner for the year, he jumped for joy, shook my hand and continued be excited for at least 5 minutes. These moments are precious and I wanted to share this one with you so you have an even greater sense (than I 'm sure you already have) of the value of your work. I have run this contest at our school for the last 16 years and will retire from it next year to be replaced by my colleague...Again, thank you." Timothy Smith said, "Thanks for another great year of math. FYI...I personally prefer to give the contest with paper, so I hope this will always be an option...I'm happy to copy my own to reduce your cost. Thanks again." Vivian Nelson said, "I had more students get more problems correct on this test than on any of the rest. It would have been great to have this test first, to encourage more of the students to try the contest more often." Chip Rollinson said, "Thanks again for another year of fun questions."

■ **Question 6-1: Comment** Chip Rollinson said, "A few kids were thrown off by the word 'integral.' One student said, 'don't we learn about integrals in calculus?' This isn't the first time that students have been thrown off by that word."

■ **Question 6-3: Comment** James Smith said, "I only had one student get this wrong, but he has a perfect score for the last 3 years. He thought that it could not be as easy as it looked-that your reference to the 'common' segment had to mean the common chord shared by the circles. The information needed to solve this was the same, but the chord was more challenging. In the past you have labeled points to designate specific segments. The lack of these on this question fooled him into solving a different problem than what you intended. Labels on the circles & segments would have helped. Did others have this issue?" Actually, no one else reported this problem, and given that 88% of responses were correct, it does not seem to have been a widespread issue. Since the question first refers to the "...line segment of length 50" and then asks "...how long is the part of the line segment...", the phrase "line segment" must refer to the same segment both times.

■ **Question 6-5: Comments** Chip Rollinson said, "A lot of students either used guess and check with their graphing calculators or they simply guessed to get the right answer. Some students used calculus to find *b*." One advisor said, "As I was reviewing Contest 6, I got a different answer for #5. In the solution, the author stated that $y = f(x)$ and $y = f(-x)$ are reflections across the *y*-axis, and also that $f(-x) = 1/f(x)$ which contradicts the hypothesis. I worked the problem, making the numerator = 1 and the denominator = 2 and derived an $f(x)$ with a very different max and min than were given. I may have done something incorrectly, but I don't see how a function can be even and reciprocal. Can you explain it to me?" Actually, the solution does not state that the function at issue has *y*-axis symmetry. The first sentence of the solution is merely stating that the graph of any function $f(x)$ and the graph of $f(-x)$ are reflections over the *y*-axis. So the graphs of both $f(x)$ and $f(-x)$ will have the same maximum value and the same minimum value. Next, we show that $f(x) = 1/f(-x)$. So $f(x)$ and $f(-x)$ are reciprocal functions. If you have a graphing calculator, graph $f(x) = e^x$ and $f(x) = e^{-x}$ on the interval $-1 < x < 1$. You will then see the relationship between a function and its reciprocal function. Setting the numerator and denominator separately equal to 1 and 2 does not work. For example, suppose we tried to solve $(x + 2)/(x + 1) = 1/2$. If we solve the equations $x + 2 = 1$ and $x + 1 = 2$, we get $x = -1$ and $x = 1$. But if we solve the equation by cross-multiplying, we get $x = -3$ (which is the correct answer).

■ **Question 6-6: Alternate Solutions** Chip Rollinson said, "I had one student use calculus to find the maximum of $60\cos A + 25\sin A$. Other students graphed it to find the max. The trick was to then subtract 1 from 65, something a few of them missed."

Statistics / Contest #6

Prob #, % Correct (all reported scores)

6-1	69%	6-4	67%
6-2	85%	6-5	45%
6-3	88%	6-6	17%