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.

■ Use the Internet to View Scores or Send Comments Just go to http://www.mathleague.com and look around! Jane Fischer wrote that our web site was not fast and efficient, and she preferred to mail results and not use the internet. Any comments?

■ Future Contests & Rescheduling Contests Contest dates are Mar. 5, and Apr. 9. Our annual *Algebra Course I Contest* is in April. If circumstances (such as **vacations, school closings or special testing days**) *require* it, we permit you to give the contest on another date. If your scores are late, please attach a brief explanation, or the scores may be considered unofficial.

■ What Do We Publish? Wonder why a solution you sent wasn't mentioned? *We discuss everything we have at the time we write the newsletter.* But the newsletter is the first thing we prepare, so we may use your score report yet not use your solution. We *try* to be efficient! Sorry to those whose solutions were too "late" to use in our newsletter.

■ Contest Books Make A Great Resource Have you bought our books for your math team? Collections of past contests are a great way to work with your team. We've enclosed a flyer so that you may order books from us.

■ General Comments About Contest #4 Monica Gantner wrote that "Students said they enjoyed this contest, even students that did not do really well." Jane Taylor wrote "I fully understand the requirement that the test be administered at the same time to all students, but we can never get all our talented math students together at one time to take this, so our scores are always low. I wish I had a solution for this, because it is a great contest." The solution is to offer the best materials available (such as our contests) and let the kids follow their interests. Scores do not matter. What matters is that we continue to offer students the opportunity to enjoy learning and talking about math.

■ Problem 4-1: Appeal (Denied) Two schools faxed us contest copies in which the last line of problem 4-1 looked like: **$^{-}3x + 4y = 25$?** One school wrote that "Our copies had this negative sign on problem 4-1. We instructed our students to ignore it after it was questioned at the beginning of the contest." The other wrote "As you will notice, problem 4-1 is very deceiving. Many of my contestants read this as $-3x + 4y = 25$. According to the official answer sheet, the problem was not intended to have a negative in front of the first term. Students who solved this problem using the negative sign were unable to get the answers expected." We rejected the appeal for three reasons. First, it *looked* like a printing error. Second, the last line of the last problem looked like $\mathbf{-10 \le x + y}$, so an example of a correctly printed negative sign was on the page for comparison. Third, the problem says that only two ordered pairs of positive integers satisfy the equation, yet $-3x+4y = 25$ is satisfied by infinitely many such pairs.

■ Problem 4-4: Comments & An Alternate Solution Monica Gantner said it was "pretty easy with a graphing calculator." Robert Morewood wrote "I was surprised at how well our students did on 4-4. But then I foolishly did it with logarithms. Gary Yang just graphed it on his calculator."

■ Problem 4-5: Comments & Alternate Solutions Monica Gantner said "4-5 was a "great geometry problem. Students often forget about similar triangles." Students David Browne, Adam Salup, Troy Raymond, Brett Britton, and Philip Cramer, and teachers Jack E. Josey, Jr. and R. Longille, put the vertex of the right angle at (0,0) and the other two vertices at (0,18) and (63,0). The equation of the hypotenuse becomes $y = -2x/7 + 28$. At the circle's center, $x = y$, so $y = -2y/7 + 28$. Therefore, $y = 14$, radius $= 14$, and area $= 196\pi$.

■ Problem 4-6: Alternate Solutions Robert Morewood found a very direct algebraic solution. Here it is: When the second inequality is combined with the second half of the first inequality, we get $(x-y)^2 \le 36(x+y) \le 36(4) = 144 \Leftrightarrow (x-y) \le 12$ (the final inequality is valid since we seek the largest such x). Since $y \ge x-12$, the second half of the first inequality becomes $4 \ge x+y \ge x+x-12 \Leftrightarrow 8 \ge x$. Note that x can actually achieve the value 8 since $(x,y) = (8,-4)$ satisfy the original inequalities. Finally, the first part of the first inequality, $-10 \le x+y$, is not needed. R. N. Leavitt noted that (1) $-10 \le x+y \le 4 \Leftrightarrow$ (2) $-x-10 \le y \le -x+4$, while (3) $x^2+y^2 - 36(x+y) \le 2xy \Leftrightarrow$ (4) $(x-y)^2 \le 36(x+y)$. Substitute (4) into (1) and you get $-10 \le (x-y)^2/36 \le 4 \Leftrightarrow -360 \le (x-y)^2 \le 144 \Leftrightarrow 0 \le |x-y| \le 12 \Leftrightarrow -12 \le x-y \le 12 \Leftrightarrow$ (5) $x-12 \le y \le x+12$. Graph 2 and 5 together (you can use a graphing calculator). The x-coordinate of the right hand point on the graph is $x = 8$. An unknown teacher sent us a very different, very clever graphing calculator solution.

Statistics / Contest #4

Prob #, % Correct (top 5 each school)

4–1	93%	4–4	62%
4–2	92%	4–5	45%
4–3	80%	4–6	34%