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** to comments@mathleague.com. You can see your results at *www.mathleague.com.*

■ **Upcoming Contest Dates & Rescheduling Contests** Contest dates (and alternate dates), all Tuesdays, are February 11 (February 18) and March 11 (March 18). If **vacations, school closings, or special testing days** interfere, please reschedule the contest. Attach a brief explanation, or scores will be considered unofficial. We sponsor an *Algebra Course I Contest* and contests for grades 4, 5, 6, 7, and 8. Get information and sample contests at *www.mathleague.com.*

■ **2025-2026 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 14 (Oct. 21), November 11 (Nov. 18), December 9 (Dec. 16), January 13 (Jan. 20), February 10 (Feb. 17), and March 10 (Mar. 17). Have a testing or other conflict? Now is a good time to put an alternate date on calendar!

■ **What Do We Publish?** Did we not mention your name? *We use everything we have when we write the newsletter.* But we write the newsletter early, so sometimes we're unable to include items not received early enough. We try to be efficient! Sorry to those whose solutions were too "late" to use.

■ **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.mathleague.com.*

■ **Contest Books Make A Great Resource** Have you seen our contest books? Kids love to work on past contests. To order, use out website, *www.mathleague.com.*

■ **Administer This Year's Contests Online** Any school that is registered for any of our contests for the 2024-2025 school year may now register at http://online.mathleague.com for the 2024-2025 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.

■ **Question 4-1: Comment** Robert Morewood said, "Gave me an opportunity to see students finally accepting the challenge of doing a problem involving a previously unknown concept (factorials this time, show great progress since the Greatest Integer Problem which they avoided earlier!)."

■ **Question 4-3: Comment and Alternate Solution** Chip Rollinson said, "I did appreciate the extraneous information given for problem 4-3." Denes Jakob said, "Line segment AB is a chord of the circle. Construct the right-bisector of this chord. The Chord Right Bisector Property states that the right bisector of a chord passes through the center of the circle. Thus, the right bisector of AB will bisect the circle into two semicircles. Also, the right bisector of a line segment is the locus of points on the plane that are equidistant from the endpoints. So, all the points on the right bisector of AB are equidistant from A and B...all the points in the semicircle that contains point A are closer to A than to B. Therefore, the area of the region is 8π."

■ **Question 4-4: Comment and alternate Solution** Robert Morewood said, "Some students worked through factorings, moving one factor at a time: 71685 = 14337×5 = 4779×15 = 1593×45 = 531×135 done! Another student, noting that factors must be odd and not too large, simply divided 15685 by 101, 103, 105, , , , until 135 gave quotient of 531."

■ **Question 4-6: Comment and Alternate Solution** Chip Rollinson said, "Problem #6 is a nice question, BUT I think it needs to get thrown out. Why? Because students with CAS calculators have a HUGE advantage and can do the problem without any work. All you have to do is type in a = sqrt(2) – 1 and then look at powers of a. You'll quickly find that a^7 does the trick. No thinking required." We do try to use questions that do not have calculator solutions that make the questions easier than intended, but it appears we missed on this one. Kudos to those students who found the same solution that Chip found! Tim Thayer said, "The left hand side of the equation is approximately $(0.414)^n$ for positive integer n. Thus, the left hand side must be in]0,1[. This means that we seek k such that the right hand side is between 0 and 1. Since $-239 + k\text{sqrt}(2) = 0$ yields k = 239/sqrt(2) = 168.9985..., the value of k must be 169. Confirming this by solving $[\text{sqrt}(2) - 1]^n = -239 + 169\text{sqrt}(2)$ leads to $n = \log_{(\text{sqrt}(2)-1)}(-239 + 169\text{sqrt}(2)) = 7$. Yay!" Student Jalaj B. recognized our disguised Pell's equation and used the rational convergents to sqrt(2) ($a + 2b/a + b$): 1/1, 3/2, 7/5, 17/12, 41/29, 99/70/ 239/169 to get that 169 pairs with 239.

Statistics / Contest #4

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

4-1	86%	4-4	70%
4-2	26%	4-5	16%
4-3	38%	4-6	39%