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 14 (February 21) and March 14 (March 21). 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*.

■ 2023-2024 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 17 (Oct. 24), November 14 (Nov. 21), December 12 (Dec. 19), January 16 (Jan. 23), February 13 (Feb. 20), and March 12 (Mar. 19). 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 2022-2023 school year may now register at http://online.mathleague.com for the 2022-2023 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.

■ General Comment About Contest #4: Andreas Evriveades said, "Love the geometry problems." Chip Rollinson said, "Thanks for a fun groun of problems (again).

■ Question 4-2: Appeal (Denied) One of our advisors appealed on behalf of a student saying, "I have a girl who answered question 2 with an OR statement. She said 72 or 60. I wasn't going to count it but it is a true statement. Wasn't sure if it would slide. It would be her only point. So a 0 or 1 for a score." To paraphrase the old saying, you can't blame an advisor for trying, but the appeal is denied. The correct answer to this question is 60. Since this student has given two answers, one of which is incorrect, the student cannot receive credit for the question. Commend the student for finding the correct answer, but explain to her that she must choose the answer she wishes to submit, not leave the choice to the scorer.

■ Question 4-5: Alternate Solution and Comments Stephanie Peters submitted an alternate solution and comments, saying "The situation described is a geometric random variable, with p = 0.5. The first girl would be the 1st flip, 5th flip, 9th flip, etc. [P(heads on 1st flip) = 1/2 = 0.5] + [P(first heads on 5th flip) = ((1/2)^4)(1/2) = 0.3125] + [P(first heads on 9th flip) = ((1/2)^8)(1/2) = 0.001953125] + [P(first heads on 13th flip) = ((1/2)^12)(1/2) = 0.0001220703]...We could continue, but the probability is getting negligible. So, 0.5 + 0.3125 + 0.001953125 + 0.0001220703 = 0.5333 which is within the required four significant digits. I would argue in the answer given that it is not technically guaranteed that the girls will eventually flip heads. It is possible (though ridiculously unlikely) that the girls could flip the coin infinitely and always land on heads since each flip is independent of the previous. Thanks! I liked this problem. Have a great day!" Chip Rollinson used the formula for the sum of an infinite geometric series toget the exact answer. Heather Quintero said, "My students took issue with the explanation for this one."

■ Question 4-6: Alternate Solutions and Comments Peter Knapp said, "My students found multiple ways of solving #6 that avoided the angle bisector theorem. Some students used a similar approach, that started with the angles, but then used the tan2x formula to convert between the 5-12-13 and the big triangle that is half of the rectangle. Another student drew a line from the corner of the rectangle perpendicular to the diagonal (parallel to the 12 side), and then managed to solve the problem using only similarity and proportions!! Several other students lacked a formal approach, but were bailed out by their calculators, computing numerically and assuming their answers were a whole number with a little bit of rounding error." Eric Berkowitz said, "Question 4-6 is fascinating...A student came up with an alternate solution...The angle on the right of where the diagonals cross has a cosine of 5/13. Find that angle, and the supplement is the angle above the intersection. Half of that angle, with an opposite side of 30, can be used with basic right-triangle trig to find the vertical side of 20, making the entire vertical length 40. Or, an alternate-alternate solution: The angle on the right of the intersection has a cosine of 5/13, so the angle above (supplement) has a cosine of -5/13. Use the law of cosines with the two half-diagonals each equaling a, and solve for a. If $2a$ is the entire diagonal, the Pythagorean Theorem can be used to find the vertical leg of the rectangle."

Statistics / Contest #4

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

4-1	72%	4-4	25%
4-2	57%	4-5	18%
4-3	36%	4-6	23%