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*!

■ **Dates of Final HS Contest and Algebra Contest** Our final contest of this school year is March 16 (with an alternate date of March 23). In addition, this year happens to be the 25th year of our annual April *Algebra Course I* contest. There's still time for your school to register! Go to **www.mathleague.com**.

■ **2021-2022 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 12 (Oct. 19), November 9 (Nov. 16), December 7 (Dec. 14), January 11 (Jan. 18), February 8 (Feb. 15), and March 15 (Mar. 22). Have a testing or other conflict? Now is a good time to put an alternate date on calendar!

■ **Rescheduling a Contest and Submitting Results** Do you have a scheduling problem? If school closings **or testing days** mandate contest rescheduling, our rules permit you to use an alternate contest date. Try to give the contest the week after the regularly scheduled date. If scores are late, attach a brief explanation. Late scores unaccompanied by such an explanation will not be accepted.

■ **A Word About Awards** Our primary purpose in sponsoring these contests has always been to foster the interest in and enjoyment of mathemetics, as well as to give students the opportunity to see challenging questions that they might not see in their regular classroom studies. To those ends, we suggest that you share our contests with all the math students in your school. Unfortunately, due to the loosening of contest rules necessary to address the realities of Covid-19 (allowing our contests to be given on multiple days, at school or at home, with or without teacher supervision), we will not be awarding plaques to high-scoring schools or students during the 2020-21 school year. We will, however, be sending a pdf of our Certificate of Merit, and schools may print as many of these certificates as they need for this year's high-scoring students.

■ **General Comments About Contest #5:** Karen Holmes said, "It was very challenging to administer the 5th contest with school closings and virtual days. Unfortunately, my student participation was down and we did not do well. I suspect other schools were impacted by recent weather, too. Barry Weng said, "Thank you for providing a way for our students to participate online this year!"

■ **Question 5-4: Alternate Solution and Appeals (Rejected)** Barry Weng suggested an alternate solution, saying "the restriction that a and b be integers was not necessary to solve the problem, but we can make use of it in this alternate solution. Substitute $x = a + bi$ into the quadratic equation and match real parts and imaginary parts. You get a system of equations, $a^2 - b^2 + 3a + 3 = 0$ and $b(2a + 3) = 1$, which yields a quartic equation in a. However, with the integer condition, the second equation can be solved by considering the integer factors of 1, namely 1 and -1, which directly gives $b = 1$, $a = -1$ and $b = -1$, $a = -2$. (These solutions do check into the first equation in the system.)" Jon Graetz and Sandy Truitt each appealed on behalf of students who answered with the two correct solutions to the equation given, $-2 - i$ and $-1 + i$, but did not answer in the required (a,b) form. The impulse to want to give credit for the students' answers is understandable. In a situation in which partial credit could be given, such as a unit test in a classroom, that would certainly be an appropriate option. Unfortunately, there is no partial credit for answers on contests, and given that the question specifies a certain form for the answer, anything not written in that form cannot be given credit. The appeals are rejected.

■ **Question 5-6: Alternate Solution and Comment** Barry Weng suggested an alternate solution, saying "The question can be phrased as one of conditional probability: what is the probability that I threw more heads than you given that we flip a different number of heads? Bayes' theorem says we can calculate this by dividing P(I threw more heads than you (and we flip a different number of heads).) by P(We flip a different number of heads.) Your official solution found the numerator to be 1/2. The denominator can be found by subtracting $1 - 5/16$, where 5/16 is the probability of ties, also from your official solution. The answer is $(1/2) / (11/16) = 8/11$." David Maycock suggested the same alternate solution, and also noted, "I think the question could have been more clearly worded. I sympathize with students who gave 1/2 as the answer; they calculated the unconditional probability that I get more heads in a round, although they did not employ your elegant symmetry argument."

Statistics / Contest #5

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

5-1	61%	5-4	15%
5-2	37%	5-5	30%
5-3	50%	5-6	9%