



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 8 (February 15) and March 15 (March 22). 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.

■ **2022-2023 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 18 (Oct. 25), November 15 (Nov. 22), December 13 (Dec. 20), January 10 (Jan. 17), February 14 (Feb. 21), and March 14 (Mar. 21). 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 our website, www.mathleague.com.

■ **Administer This Year's Contests Online** Any school that is registered for any of our contests for the 2021-2022 school year may now register at <http://online.mathleague.com> for the 2021-2022 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:** Eli Durmer said, "We have been thoroughly enjoying the math league this year. It is great." Scott Matthews said, "Thanks for all of the fabulous contests over the years. You consistently create great questions and great contests." Robert Morewood said, "Another set of nice problems with, finally, something for the senior students who have heard of logarithms and cosine sum identities! That is appreciated."

■ **Question 4-3: Alternate Solution** Tom Uhen said, "I solved it using logs." $1000\log(1000) = x\log(100)$; so $1000^3 = x^2$, $3000 = 2x$, and $1500 = x$.

■ **Question 4-4: Alternate Solution** Robert Morewood said, "Those with just a little trig can use their calculators on #4: $\cos(180 - \sin^{-1}(3/5) - \cos^{-1}(5/13))$ {and those aware of the obtuse solution to $\sin(A) = 3/5$ would discover that this produces a negative solution above and so declare it extraneous}."

■ **Question 4-5: Alternate Solution** Robert Morewood had another alternative solution to 4-5, saying that those familiar with trig can use calculators to complete " $\sqrt{(\tan^2 72 + (1 + 1/\cos 72)^2)}$ " But getting an exact value out of that requires some rather serious trig! (Or serious radical arithmetic if you already happen to know exact values for $\tan(72)$ and $\cos(72)$.)"

■ **Question 4-6: Comments and Appeals (Accepted)** We heard from quite a few of our astute advisors regarding the wording of this question! Among those submitting comments and appeals were Chris van Benthuyzen, Lisa Borenstein, Eli Durmer, Peter Knapp, Scott Matthews, Robert Morewood, Michael Oberle, Forest Reid, Joshua Ruark, Brian Sterr, and Tom Wharton. The flaw in the wording of the question was the phrase "For how many positive integers $n < 2022$ WILL the probability be $1/2$ that the chosen balls are of different colors." (Emphasis added.) The problem is that even when choosing one of the integers n that would make a probability of $1/2$ possible, it is not guaranteed that the probability will in fact be $1/2$ unless the proper distribution of the n balls between red and green is correct. Consider as an example choosing 4, the least acceptable possibility, as the value of n . If the distribution of balls includes 3 of one color and 1 of the other, the probability of choosing 2 balls of differing color is in fact $1/2$ as the question anticipates. However, using the same value of 4 for n but including 2 balls of each color, the probability of choosing 2 balls of differing color is actually $2/3$. It is thus true that no chosen value of n can guarantee in and of itself any certain probability of choosing different-colored balls, $1/2$ or otherwise. With this in mind, it is absolutely correct to answer 0 to this question, and thus answers of 0 should be ACCEPTED and given credit, as well as the official answer of 43. On the plus side, at least one advisor who pointed out the problem with the wording also noted, "4-6 is a cool problem and proved to be quite challenging for the students."

Statistics / Contest #4

Prob #, % Correct (all reported scores)

4-1	44%	4-4	22%
4-2	71%	4-5	15%
4-3	58%	4-6	4%