# Math League News

■ **Use the Internet to View Scores or Send Comments** to comments@mathleague.com.

■ **Contest Registration and Books of Past Contests** Register for next year by mail or on the internet right now! Renew now so you don't forget later! *You may ask us to bill you this fall.* We sponsor an *Algebra Course I Contest* and contests for grades 4, 5, 6, 7, and 8. Use the registration form enclosed with Contest #6 to register for contests or to **Order Books of Past Contests**.

■ **2016-2017 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 7 (Feb. 14), and March 14 (Mar. 21). *Do you have a testing or other conflict?* If so, right now is a good time to put the alternate date on your calendar!

■ **Test Security Procedures** Students are expected to sign the honor pledge posted on our website, affirming that they "will neither give nor receive help with any of the Math League Contest questions either before or during any of the Math League Contests." Of course, in the end contest security is really a cooperative effort. Schools should do whatever they can to prevent premature disclosure of questions and/or answers. For our part, we are always monitoring the results for any suspicious outcomes, which we then investigate thoroughly.

■ **End-of-Year Awards and Certificates** Symbols identify winners. We ship plaques to the advisors. Errors? Write to *Math Plaques, P.O. Box 17, Tenafly, NJ 07670-0017.* Identify the award, contest level, your name, and the school's name and address. The envelope for Contest #5 contained Certificates of Merit for the highest scoring students overall and in each grade for the year. Do you need extra certificates for ties? If so, send a **self-addressed, stamped envelope large enough to hold certificates (you need to use *TRIPLE* postage)** to *Certificates, P.O. Box 17, Tenafly, NJ 07670-0017.* (Please allow one week.)

■ **General Comments About the Contest (and the Year)** Chip Rollinson said, "Thanks for another fun year of problems." Dave Feinberg said, "Great contest!" James Conlee said, "Thanks for another great year of contests. Looking forward to next year." Chip Rollinson said, "Thanks again for another year of fun questions."

■ **Question 6-1: Appeal (Rejected)** Dave Feinberg appealed on behalf of a student whose answer was 6. This student based the answer on the false assumption that a square would not be considered a rectangle. If that were true, the two rectangles called for by the question would have to have dimensions of 1x6 and 2x3. Of course, a square is just a rectangle with equal side lengths, and since the question calls for the least possible area, 4 is the only correct response. The appeal is rejected.

■ **Question 6-3: Appeals (Rejected)** Debbi Marks and Edward Groth both appealed on behalf of students whose answer to this question was 0. Setting $k$ equal to 0 and $x$ equal to 2 will in fact create a situation in which the left-hand side of each equation has the same value (6), but since in each case the right-hand side specifies a value of 0 for the expression on the left-hand side, the equations would not be satisfied by setting $k$ equal to 0. The appeals are rejected.

■ **Question 6-4: Alternate Solution** Some of Edward Groth's students found the solution by constructing a rectangle around the polygon, finding the area of that rectangle, and then subtracting from it the areas of all of the 45-45-90 triangular regions thus created that were external to the original polygon $P$.

■ **Question 6-6: Comment and Alternate Solution** JK Floyd suggested that the phrase "roll a 9" mightn't really be apropos when rolling two standard 6-sided dice, given that a SUM of 9 would actually be necessary. One of his students also pointed out that the question didn't specify that the dice were traditional 6-sided dice. Although the phrase "roll a 9" is commonly (if perhaps a bit inexactly) used when discussing the sum appearing on two traditional 6-sided dice, it is a valid point that in a world that includes such things as 4-, 8-, 12-, and 20-sided dice, specifying that the question intended traditional 6-sided dice would have been a good clarification. Chip Rollinson had several students use infinite series to solve, as follows: Lee's probability of winning is

$$\frac{1}{9}+\left(\frac{8}{9}\right)^2\frac{1}{9}+\left(\frac{8}{9}\right)^4\frac{1}{9}+\ldots$$
$$=\frac{\frac{1}{9}}{1-\left(\frac{8}{9}\right)^2}=\frac{\frac{1}{9}}{\frac{17}{81}}=\frac{9}{17}$$

Thus, Pat's probability of winning is $\frac{8}{17}$. To have a fair game, Pat should have to pay $P$ dollars where

$$(-400)\left(\frac{9}{17}\right)+P\left(\frac{8}{17}\right)=0.$$

Solving, $P = 450$.

**Statistics / Contest #6**

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

| | | | |
|---|---|---|---|
| 6-1 | 65% | 6-4 | 47% |
| 6-2 | 82% | 6-5 | 25% |
| 6-3 | 44% | 6-6 | 17% |