M A T H

12/06

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.

■ Online Score Reports: What To Do If The Mail Is Late Roughly 3 weeks after each contest, "results" appear on our Web site, *www.mathleague.com*. Mailed score reports arrive after that.

■ Send Your Comments to comments@mathleague.com

■ Contest Dates Future HS contest dates (and alternate dates), all Tuesdays, are Jan 9 (2), Feb 6 (Jan 30), Mar 6 (Feb 27), & Apr 10 (3). (Alternate dates are the preceding Tuesdays.) For vacations, testing days, or other *known* disruptions of the school day, please *give the contest on an earlier date*. Please explain late scores. We reserve the right to refuse late scores lacking an explanation. We sponsor an *Algebra Course I Contest* in April, as well as contests for grades 4, 5, 6, 7, & 8. See *www.mathleague.com* for information.

■ Regional Groupings Within guidelines, we *try*, when possible, to honor regional grouping requests for the next school year.

■ What Do We Print in the Newsletter? Space permitting, we print every solution and comment we receive. We prepare the newsletter early, so we can use only what we have at that time.

■ Some Tips on Getting Students Involved One advisor asked how to persuade more "always busy" students to take our half-hour contests. Would you like to share your tip? Here's a start: **1)** Hold contests during lunch. Serve ice cream or fruit to those who eat while writing the contest. **2)** Use a bulletin board to name top students on each grade. Make a loudspeaker announcement too. **3)** Send a report to a local community newspaper. **4)** Serve cookies and drinks, with funds provided by the student government. **5)** Hold the contest jointly with a neighboring school. The kids will enjoy the occasional travel and meeting kids from another school. **6)** Post a colorful announcement the day before the contest so no one "forgets" about it on the day of the contest. **7)** At Awards Night, give our Certificate to the students on each grade level who score highest on these contests.

■ Our Score Report Center Brother Gary said "Thanks for the great improvement." Alison Kenefick and Robert Lochel called it "very user-friendly." Linda Davies said "I don't like it. It takes longer." Sue Docker called it "very convenient, a real time saver." Curt Dumermuth said "more cumbersome than the past." Kenneth Smith "loves the system." Michael Davis called it "quite smooth."

■ General Comment About Contest 2 Ben Dillon said "Usually Contest #1 is the easiest of the year, but it wasn't this time." Trung Vong said "much easier than Contest #1." Perry Page said "Thanks for providing the students with this opportunity to stretch their thinking." Todd Braun "enjoyed Contest #2 as the kids were able to attempt all the problems." Jon Graetz called this "the best contest I can remember. Every problem was non-trivial, and even the hardest were elegant and workable." Nola Forbes "had a record turnout." Joey Hurd said "Tough test for our kids!" Lynette Quigley said "Keep the challenges coming."

■ Problem 2-1: Appeal (Denied) Jim Burton asked "What if they wrote a decimal less than $\sqrt{2006}$ whose square was 2006 in terms of significant digits?" *We must FIRST begin with the correct answer. ONLY THEN do we round the result.* Appeal denied.

■ Problem 2-2: OOPS! An Error In Wording How did the word *isosceles* creep in? Luckily, we gave a diagram. As Georgette Macrina (and many others) wrote "The trapezoids weren't isosceles. This confused some students but did not cause a problem."

■ Problem 2-4: An Appeal (Denied) Gary Reitnouer's students "felt that the wording was confusing." Kim Barkowski said "One student . . . [thought] there had to be more than 1 pen per package." Two appeals claimed that all packages contained equal numbers of pens (the question made no such implication).

■ Problem 2-5: Comments Sean Murray "really liked #2-5. It had an interesting answer and it wasn't impossible for the kids to find! Great question." Jim Barys said "For students with a CAS (as in the TI-89), this was a non-problem."

■ Problem 2-6: Comment, Question, Appeal (denied) Fred Harwood's student sought credit for an answer that involved "sin 45." Is that radians or degrees? Students must evaluate such functions, although numerical expressions need not be simplified. Tom Uhen said "many kids wasted time trying to figure out the picture." *The most difficult part of 2-6 was drawing the picture. That was intentional.* Tifflin James overheard one student say "I didn't know you could even have such a shape." Ginny Magid said Finding the rt. isos. $\triangle$ was a challenge." Cindy Walker said "How do you prove that $\triangle BAO$ is isos?" Jenne Sand echoed "It's a great question, but that seems like an important detail we'd like to see." Mary Buda did not "see how to prove that there was an isos. rt. triangle." This is a very nice plane geometry problem whose result looks obvious. Of course, "It's obvious" usually means "I don't know how to prove it." Except I got lucky this time: I can prove it!

Here's a proof that $m\angle OBA = 45$. In our solution, we claimed that $\triangle BAO$ is isosceles, but never proved it. The proof, though elusive, is easy to follow. [Try to write your own proof before reading on.] Many teachers asked us to provide a proof. Call the square L. Draw a radius from the center of the semicircle to each of its two points of tangency on square L. These radii complete a smaller square that we'll call S. Draw the diagonal of L that contains its upper left vertex. Squares S and L, and the quartercircle contained in square S, are all symmetric across the diagonal of S, so they are also symmetric across the diagonal of L. That means the entire circle and square L are also symmetric across the diagonal, so all corresponding points on the bottom and right sides of square L are reflections of each other across L's diagonal. From this, we know that the legs of the right triangle inscribed in the dotted semicircle are congruent, so the right triangle is isosceles.

Statistics / Contest #2

Prob #, % Correct (all reported scores)

Prob #	% Correct	Prob #	% Correct
2-1	74%	2-4	32%
2-2	85%	2-5	27%
2-3	80%	2-6	3%