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.

■ Send Your Comments to comments@mathleague.com. View results at www.mathleague.com before they arrive in the mail.

■ Upcoming Contest Dates & Rescheduling Contests Future HS contest dates (and alternate dates), all Tuesdays, are Jan 13 (6), Feb 24 (17), & Mar 24 (17). (Each alternate date is the preceding Tuesday.) If vacations, school closings, or special testing days interfere, please reschedule the contest. Attach a brief explanation, or scores may be considered unofficial. We sponsor an *Algebra Course I Contest* in April, as well as contests for grades 4, 5, 6, 7, and 8. Get information and sample contests at *www.mathleague.com*.

■ 2009-2010 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 Oct. 20(13), Nov. 17 (10), Dec. 15(8), Jan. 12(5), Feb. 23(16), and Mar. 23(16). If you have a testing or other conflict, right now is a good time to put an alternate date on your calendar!

■ 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.

■ General Comments About Contest #3 Timothy Ryan said, "Very nice geometry problems. Some of my younger students could answer the geometry questions while the older students struggled to remember the geometry rules." Maria Gale said, "My students are really rising to the challenge this year. Good questions and my students are doing well. I am very excited this year, and I have been doing this for almost 20 years!" Mark Luce said, "I once again loved both of the geometry problems on this contest. (I am a 'sucker' for pretty geometry problems.)" Kathy Erickson said, "Contest number 3 was the most fun my class has had since contest number 2!" Joni Ables said, "Thank you for doing this contest. After 2 years of giving it to my students, the other teachers in my dept. have finally come on board and are encouraging their students to participate! This last round I had more students show up then ever before and they really enjoyed the challenge." Sandra Abatemarco said, "I wanted to thank you for an interesting test. What I liked about it was that the students got a variety of questions correct, not just the first few. Even students with lower scores were able to do the last questions also. I think this will help build confidence." Fred Harwood said, "Originally, I thought the contest easy, but when we started to discuss it and I marked the answers, I realized that this was not the case. I had chosen effective routes to the solutions, and thus thought it easy. Others were side tracked by different avenues of approach. I didn't have time to think about what alternative routes students would take. Well done." Cyndee Hudson said, "This was the best test ever--all levels were actively engaged and worked the entire time. I was impressed with how many were able to do the "harder" ones and how many messed up on #1 and #2. Thanks for a great test." Jon Graetz said, "Great contest!" Chuck Garner said, "I really liked Problems 3-5 and 3-6: wonderful problems where a flash of insight makes the problem easy, but they are still achievable by brute force." Jeff Ulrich said, "Great questions. This contest would have been a good one to do without calculators." Ronald Nagrodski said, "One of the better contests I have had the pleasure of giving. I have been doing these since 1977. Thanks."

■ Question 3-1: Comment Richard Wright said, "several of my students got number 1 wrong because they wrote 2^{2007} instead of 2007. They were upset that they could not receive credit for their answers." That's a shame, Richard, but you were correct not to give credit for that response.

■ Question 3-2: Comment Chris Leuthold said, "In problem 3-2, 24 is the harmonic mean for 20 and 30. Coincidence?"

■ Question 3-3: Appeal (Denied) One advisor found that some students interpreted a, b, c, d as digits, thus making ab, ad, cb and cd all two-digit numbers. Those students got an answer of 190. Since nothing in the question leads to a reasonable inference that the variables represent individual digits, this answer should not receive credit.

■ Question 3-4: Comments Ted Wardell said, "Although the 'useful theorem' provided as a hint for #4 was a very intriguing method for solving the problem, I felt that it almost gives too much information. I think it was fairly easily solvable with just the first picture through finding the side lengths of the 3 smaller equilateral triangles and an analysis of congruent segments." Jon Graetz said, "Problem 4 was a nice opportunity for visual learners to shine." Chuck Garner said, "half of my students thought the diagram basically gave them the answer, while the other half said the diagram confused them!"

■ Question 3-5: Comments and Alternate Solution Several advisors correctly noted that $\pi/6$ could be accepted as an alternate way to express the correct answer. Thanks to Christine Deveau and Jean Nightingale for mentioning the possibility. Laniel Gibson pointed out an alternate solution: "many students used the law of sines. They found the lower right angle of the large right triangle by using the inverse tangent, found the obtuse angle of the small triangle (its complement) to the right, and then used the law of sines to find angle P." Kelly Ogden said, "This problem could also be solved by first using Right Triangle Trig, and then by using Law of Sines. It's nice to see a problem that can use Trig!" Others who noted the option of using the law of sines included Jon Graetz. Referring to the use of m to represent the measure of an angle, Coleen McGregor said, "Many of our students were unsure what was required in Question #5 of the 3rd high school contest." Jennifer Clough said, "In grading the contest, I realized that many students were getting question 3-5 correct while using two false assumptions. They were treating the 6-8-10 triangle as a 30-60-90 triangle and the obtuse triangle as an isosceles triangle. I understand that students often guess the right answer or make (multiple) simple mistakes that ultimately lead to the correct answer, but these are bad assumptions that are OFTEN made by students. I feel students shouldn't benefit from glaring errors such as these, while students who know what they are doing and make arithmetic or calculator errors do not get the correct answer."

■ Question 3-6: Comments and Alternate Solution Some advisors raised the issue of whether the constant term must be considered a coefficient. In this context, it must be. Keith Calkins said, "I especially liked question 6 on contest 3 since it connected polynomials and bases. Maybe others don't think of polynomials as place value numbers with an unknown base, but that concept was especially useful for this question!" Mark Luce said, "I thought the last problem was a very challenging algebra problem. One of my two students with a perfect score wrote a very nifty little calculator program to solve the problem, by using $P(1) = 6$ and $P(5) = 426$ as constraints." Alan Lipp presented an alternate solution and comment, saying, "this was a lovely problem, all the more surprising that a high degree polynomial could be determined by two points. As an alternate solution consider the following: Using the notation provided in the solution we have P as a fourth degree polynomial with $a+b+c+d = 6$ and $a+5b+25c+125d = 426$ Subtract to get $4(b+6c+31d) = 420$ so that $b+6c+31d = 105$. Therefore, $(b+c+d) + 5(c+6d) = 105$ so that $b+c+d = 5$, the only positive multiple of 5 less than 6.) Therefore, $a = 1$ and b, c, and d are the values (0,2,3), (1,2,2), or (1,1,3) in some order, and $5(c+6d)=100$ so that $c + 6d = 20$. Either solve by inspection or note that $c = 2(10\text{-}3d)$ must be even so that $c = 2$ and $d = 3$."

Statistics / Contest #3

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

3-1	70%	3-4	45%
3-2	81%	3-5	52%
3-3	67%	3-6	30%