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.themathleague.com before they arrive in the mail.

■ Upcoming Contest Dates & Rescheduling Contests Future HS contest dates (and alternate dates), all Tuesdays, are Jan 12 (5), Feb 23 (16), & Mar 23 (16). (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.themathleague.com*.

■ 2010-2011 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. 19(12), Nov. 16 (9), Dec. 14(7), Jan. 11(4), Feb. 22(15), and Mar. 22(15). 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.themathleague.com.

■ General Comments About Contest #3: Tracy Thompson said, "Our math club is really enjoying the problems this year! Good challenges, and most accessible to younger students who may not have studied logs, etc." Donald Brown said, "Overall I think Test Number 3 was one of the more interesting and difficult tests in recent years." Ted Heavenrich said, "A good set of problems! However, I would have interchanged the last two, as problem 3-6 was very accessible and many of my weaker students got it. On the other hand, problem 3-5 was quite challenging." Cyndee Hudson said, "As a teacher I thought this was the easiest so far; but my students thought it the hardest. Go figure!" Ginny Magid said, "My students found this contest to be the most challenging so far this year." Rob Frenchick said, "It seemed that this contest was really tough. ... Even the first question required some really good thinking." Maria Gale said, "Challenging contest. My freshmen were stunned." Andy Macpherson said, "Lovely questions ... great springboard to nice mathematical conversations. I was surprised that students didn't do better." Wes Carroll said, "I assume you hear this all the time, and it's true: you are doing a great service to us all by promoting in-depth thought among high-schoolers."

■ Question 3-1: Comment Donald Brown said, "Problem 1 was one of the most challenging and difficult first problems in a long time."

■ Question 3-3: Comment Chris Leuthold said, "Problem 3-3 is one of the cleverest problems I've seen in my 36 years of teaching high school math."

■ Question 3-4: Alternate Solution and Appeals (Denied) Don Bonamer proposed an alternate solution. He used logarithms to solve the question, by substituting x for $\frac{t}{r}$ and x^{-1} for $\frac{r}{t}$ and taking the log of each side, so

$$\frac{-0.5\log x + 0.25\log x - 0.125\log x}{\log x} = y. \text{ Simplifying,}$$

$$\frac{(-0.5 + 0.25 - 0.125)\log x}{\log x} = y, \text{ and thus } y = -0.375 \text{ or } -3/8.$$

Wes Carroll must have had a student use a similar procedure, because he submitted an appeal wondering whether credit could be given for an answer that is admittedly mathematically equivalent to -0.375: $[3\ln(r/t)]\div[8\ln(t/r)]$. This appeal is denied. It is incumbent on the solver both to solve the (non-trivial) problem presented and to make all reasonable simplifications where failure to do so would indicate possible lack of knowledge. Finally, Catherine Broyles had a student submit an answer of -0.37499; this is *not* correct, because if the answer is expressed to the fifth significant digit it should be -0.37500.

■ Question 3-5: Comments and Alternate Solution Ted Heavenrich said, "3-5 was quite challenging. Several students quickly saw that x could not be 1 or 10. They then observed that if 2 worked, so did 18, etc. Thus, a good guess was 1, 9, 10 and 11, as the difficulty appeared to be with numbers near 10." Andy Macpherson said, "One student thought that a trapezoid could have sides of 10, 10, 4 and 5, with 4 and 5 being the bases. He did acknowledge that this would make for a slight modification to the question." Benjamin Dillon suggested an alternate solution. "Let h be the height of the trapezoid, with a domain of (0, 4]. There are 4 possible lengths for x: $x = 10 \pm \sqrt{4^2 - h^2} \pm \sqrt{5^2 - h^2}$.
A collective graph of all 4 covers a range for x of (1,9) UNION (11,19), meaning the impossible positive integer values below 19 are 1, 9, 10 and 11."

■ Question 3-6: Comments and Appeal (Denied) Maria Gale said, "The last one was good, but I think in terms of difficulty it should not have been last." The statistics would seem to bear that out, Maria! Donald Brown said, "Problem 6 lends itself to a 'brute force' attack. I had several students get [it] correct as the ONLY problem they got correct. This has never happened before in my memory." Finally, Jon Graetz had a student answer "15384"; as Jon himself noted in his appeal, the problem clearly requests the 6-digit number *ABCDE*6, which includes the 6. So, Jon, you were correct in your anticipation that the appeal is denied.

Statistics / Contest #3

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

3-1	79%	3-4	36%
3-2	71%	3-5	12%
3-3	48%	3-6	52%