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*.

■ **Send Your Comments** to comments@mathleague.com

■ **Upcoming Contest Dates & Rescheduling Contests** Contest dates (and alternate dates), all Tuesdays, are February 23 (February 16) and March 23 (March 16). 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*.

■ **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!

■ **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*.

■ **General Comments About Contest #4:** One advisor wrote to us stating that this month's contest was inconvenient given the end of the semester and the schedule for final exams. Please note that, as stated above in the section on contest dates and similarly in prior newsletters, we always provide an alternate date for each contest. When school activities conflict with both dates, we also allow contests to be rescheduled for any date proximate to the official date. James Conlee said, "Once again another well-constructed contest. Good degree of difficulty for 30 minutes." Denes Jakob said, "As always, we enjoyed the contest." Timothy Baumgartner said, "Thanks for another fun contest!" Jenne Gregor and Greg Sand said, "Great problem set." Richard Serrao said, "Definitely the most challenging so far." Fred Harwood said, "My students found this one the toughest." George Reuter said, "We loved the contest." Keith Calkins observed, "Second contest this year with the same number as the correct answer for two questions!" Carl Clark summed it up with his one-word comment, "Brutal!"

■ **Question 4-1**: **Alternate Solution** Jeff Prinz and James Conlee each pointed out that some students did this question by taking the natural log of each side, as follows:

$\ln[(10^{10})(201^{10})] = \ln[2010^x]$, so

$\ln[(10^{10})(201^{10})] = x\ln 2010$. Isolating x yields

$$\frac{\ln[(10^{10})(201^{10})]}{\ln(2010)} = x$$

$10 = x$.

■ **Question 4-2**: **Comment** One advisor commented, "How many ways can we say 'read the questions carefully'? On Question 4-2 they often answered 1:1 thinking it asked for shaded to non-shaded." Yes, reading the question carefully is always advisable!

■ **Question 4-3: Alternate Solution** Denes Jakob suggested the following alternate solution to Question 4-3: Using the two given points on the line, the slope is:

$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{(73 - k)}{9}.$$

Because m is a positive one-digit integer, k must be 1, 10, 19,..., or 64. Plugging the slope m above and the point $(1,k)$ into the equation for the line $y = mx + b$, $b = \frac{(10k - 73)}{9}$. The only value of k from the set above that makes b a positive one-digit integer is 10, therefore $k = 10$.

■ **Question 4-5: Comments, Appeals (Denied) and Alternate Solution** Question 4-5 triggered quite a number of responses from our advisors! Several advisors wanted to know whether an answer of "1 minute" would be acceptable. It is not, since the question specifically asks for the number of seconds; the only correct answers would be "60" or "60 seconds." As advisor Keith Calkins observed, "On question 5 several students answered 1 minute (but it clearly asks for how many seconds) so we could not give credit for this otherwise correct answer!" Several other advisors appealed for an answer of 30 seconds to be considered correct; this appeal is also denied. This answer was arrived at by students who plugged in rates of 0.25 and 0.75 for the two knights. There are several problems with this approach; for one, the knights would meet for the second time before each turned at the other's starting point as implied by the question. For another, choosing these rates does not allow for a unique answer to the question; ANY answer under 60 could be justified by arbitrarily choosing two rates that are in excess of a 2:1 ratio and counting the second meeting as occurring before the faster knight reaches the slower knight's starting point. There is nothing wrong with plugging in numbers when attempting to solve a difficult question, but the numbers chosen must fit all the parameters of the question! The exceptionally high percentage correct on this one probably indicates that many students followed the wisdom summed up by George Reuter, who said, "My students liked question 5, since it gave an opportunity to use an old math league trick, which they call The Law of Soundsaboutright: if it would make the problem easier to make the knights travel at the same rate, and the problem doesn't say they aren't traveling at the same rate, make them travel at the same rate." We agree, but would take if further: students must be extra careful to be sure nothing in the question *precludes* the choosing of the numbers in question.

■ **Question 4-6: Comments** Several advisors found the wording of Question 4-6 difficult or confusing, especially given that we chose not to provide an illustration of the situation. Jenne Gregor and Greg Sand said, "We wish we'd had a picture for #6!" Jack Siderer said, "It was a good problem, but I would have given the diagram." James Conlee said, "Perhaps a graph or image would have made this question a little more accessible given the time constraint." One advisor objected to the phrase "circular arc *AB* with center C," saying that it was vague. That phrase, however, is a standard phrase with an established mathematical definition; the center of an arc is the same as the center of the circle of which the arc is a part. Another advisor thought the phrase "equilateral Gothic arch" itself was confusing, thinking that the implication was that the three components of the arch would be equal in length. That interpretation, however, is neither the actual definition of the phrase, nor is it consistent with the instructions given within the question. Yet another advisor wondered whether the question might have some bias in favor of students with prior exposure to advanced architectural concepts, travel to Europe, etc. This last point might be well taken in that those few students who could visualize an equilateral Gothic arch based solely on its name might have had a slight edge in constructing the diagram, but they still would have had to follow the directions in the question, which clearly defines the concept. In sum, the question was intended to be exceptionally difficult, and it looks like we were successful in making it so!

Statistics / Contest #4

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

4-1	85%	4-4	28%
4-2	67%	4-5	84%
4-3	60%	4-6	6%