# 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.

**■ Contest Dates** Future HS contest dates (and alternate dates), all Tuesdays, are Dec. 4 (Nov. 27), Jan. 8 (15), Feb. 5 (Jan. 29), Mar. 5 (Feb. 26), and Apr. 9 (2). Except in Jan., the alternate date is always the preceding Tuesday. Do you have conflicts with our contest dates? Our rules say that, in case of vacations, special testing days, or other *known* disruptions of the normal school day, you should *give the contest on an earlier day*. If scores are late for due cause, please attach a brief explanation. We reserve the right to consider as unofficial late scores lacking such an explanation. We sponsor an *Algebra Course I Contest* in April, as well as contests for grades 4, 5, 6, 7, and 8. See www.mathleague.com for information.

**■ Received Your HS Contest Package Late?** If you have ***not yet*** received the contests, phone 1-201-568-6328 so we can ship another set. If you just recently got the contests, *please take Contest #1 as soon as possible, even if it's late!*

**■ The Score Report and the Cumulative Column** Students on your score report **must** take the contest at the exact same time. Do not include students taking the contest during any later class period. Below is part of a score report. The *Total* column is for Contest 2 totals only. The *Indiv. Cumulative* is for student totals for the first 2 contests. This column is optional; but high scoring students not tallied here cannot be named in our newsletter. Chris Lewis got 5's on the first 2 contests and had a cumulative total of 10. Pat Harris got a 5 and had a cumulative total of 9. Team members may vary each contest—use your school's 5 best scores each time, *and submit additional sheets if needed.*

Contest Number (Check One): ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 Team Score *18*

1 = Correct, 0 = Incorrect, No Partial Credit

| Highest Scoring Participants Please PRINT Last Name, First Name | Question 1 ↓ | 2 ↓ | 3 ↓ | 4 ↓ | 5 ↓ | 6 ↓ | Total ↓ | Indiv. Cumulative |
|---|---|---|---|---|---|---|---|---|
| 1. *Lewis, Chris* | 1 | 1 | 1 | 1 | 1 | 0 | 5 | 10 |
| 2. *Harris, Pat* | 1 | 1 | 1 | 1 | 1 | 0 | 5 | 9 |
| 3. *Smith, Lee* | 1 | 1 | 1 | 0 | 0 | 0 | 3 | |
| 4. *Nelson, Jan* | 1 | 0 | 1 | 1 | 0 | 0 | 3 | |
| 5. *Sun, Ronnie* | 1 | 1 | 0 | 0 | 0 | 0 | 2 | |
| TEAM TOTALS ➧ | 5 | 4 | 4 | 3 | 2 | 0 | 18 | |

Completion of the "Cumulative" column is optional, but ***must*** be completed for any student who might be listed as a League high scorer.

**■ Authentication of Scores** To give credibility to our results, we authenticate scores high enough to win recognition. Awards indicate compliance with our rules. Please ask students to read the *Selected Math League Rules* on the back of this newsletter and sign a sheet to confirm knowledge of the rules. *Keep* the signed copies. Do *not* send them to us unless we request authentication from you.

**■ Viewing Scores on the Internet** Roughly 3 weeks after a contest, scores will appear at http://www.mathleague.com.

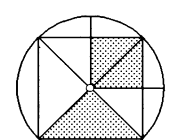
**■ General Comments About the Contest** Bob Smith said "What a great contest to kick off the year. I really liked the last question. It had very simple mathematics, but used clever reasoning. Many students never see the method for converting repeating decimals to fraction form related to this question." Mike Buonviri's 70 students "thoroughly enjoyed this contest. It had a good mix of questions." Halyna Kopach called it a "great contest." Bryan Knight said we did a "great job of providing a nice mix of problems approachable by students in a wide range of math courses." Keith Calkins said Contest #1 was a "nice easy contest to start the year." Dave Ollar echoed that it was a "very good Contest #1."

**■ Problem 1-1: Alternate Solution** Jack Josey, Jr. said that $a+c = -1$, so $a-b+c-d = (a+c)-(b+d) = -1-2002 = -2003$.

**■ Problem 1-2: Comment** Teacher Bryan Knight noted that the sequence is geometric with $a_1 = 1$ and $r = 2$. The sum $= 1(1-2^n)/(1-2)$. Thus, $65535 = 2^n-1$, so $2^n = 65536$ and $n = 16$.

**■ Problem 1-3: Comment** Keith Calkins said 1-3 was easy, "but I was quite disappointed with how students performed on it."

**■ Problem 1-4: Alternate Solutions** Student Emily Grubert used $r = 4$ and algebraic properties of isosceles right triangles. Student Derek Holly used a clever visual approach. Both shaded regions are equal in area: each is 1/4 of the large square. The radius of the circle = 4. Area of shaded triangle = 8 = area of shaded square.



**■ Problem 1-5: Alternate Solution** Bryan Knight used the formula for an arithmetic sequence's $n$th term: $a_n = a_1 + (n-1)d$. Thus, $256 = 81 + (n-1)d$, or $175 = (n-1)d$. Similarly, with 144 as the $k$th term, $63 = (k-1)d$. The greatest common factor of 175 and 63 is 7. Since 7 is prime, $d = 7$, and $n = 1 + 175/7 = 26$.

**■ Problem 1-6: Comments, Alt Sol'n, Appeal (Denied)** One advisor wrote "Two students gave 41 and 101 as answers. I don't see what's wrong with it." The fraction $1/101 = 0.\overline{0099}$ is purely periodic; but it's period is 4 digits long, not 5. Marty Badoian was disappointed that this "very interesting problem in elem # theory" can be solved with a calculator without knowing the # theory. Student Bobby Lo wrote this program for his calculator :For(P,5,999,2) :If int(99999/P,1)=0 :Then :Disp P :End :End The int function finds factors of 99999. The calculator displays 9, 41, 123, 271, 369, and 813. Eliminating multiples of 3 yields 41 and 271. Students Dmitriy Karabaum & Zachary Harper used the same reasoning, but no program. Keith Calkins sent *unit fraction* notes he uses with his classes. Halyna Kopach thought "1-6 was a great question." Keith McLean said "1-6 was one of the best questions I've seen. It has lovely research possibilities." Bryan Knight called 1-6 "a nice introduction to repeating decimals."

## Statistics / Contest #1

*Prob #, % Correct (top 5 each school)*

| Prob # | % Correct | Prob # | % Correct |
|---|---|---|---|
| 1-1 | 94% | 1-4 | 73% |
| 1-2 | 73% | 1-5 | 73% |
| 1-3 | 81% | 1-6 | 18% |