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## OUR HIGH SCHOOL TEACHERS 1987-88

We couldn't be more pleased to be able to end this 1987-88 column with the news of an exciting possibility.

Al Morse, one of our mathematics teachers from William Chrisman High School, who was profiled here in December, has been nominated for THREE teaching awards! The first is the Presidential Award for Excellence in the Teaching of Mathematics for Missouri, which was won two years ago by Sheri Adams of Truman High School, another of our MPI mathematics teachers. The second is the Independence Teacher of the Year Award, for which Al is one of six finalists. And, the third is the Excellence in Teaching Award of the Greater Kansas City Area.

We sincerely wish Al luck, and hope that in a future issue of this newsletter we will have good news to report.

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## PAST STUDENTS SPEAK UP: WORDS FROM 1986-87

We recently sent a brief questionnaire to last year's MPI students, and include below some excerpts from their replies. [One comforting note is that the first semester (self-reported) GPA of the 20 survey respondents is 3.44, an exceptional figure for incoming freshmen!]

In answer to "List specific study skills or habits you developed because of your experience at the MPI that have been vital for college", some

replied:

- Working in study groups w/friends, helping peers, good test-taking skills, i.e., pacing, judging difficulty, finishing in time allowed.
- Being prepared for anything the teacher would ask, study continually instead of at the last minute. Get sleep before tests.

In answer to: "List specific thinking/reasoning strategies you developed because of your experience at the MPI that have been important for college or other experiences":

- To attack a problem and create a solution by building upon a foundation of everything that I know about the situation.
- Both Delaware's and Waring's tests have been much more complex and harder than tests I have now. They made me think harder than I had ever done up to that point.
- I learned to step back and look at the entire picture before starting a problem.
- I have learned to attack problems by breaking them down piece by piece.

In response to: "Miscellaneous comments and recommendations to us":

- MPI definitely was one of the major factors helping me break out of my shell. Through friendships and mathematical

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stimulation, I became (somewhat) less shy. At first, I DREADED talking in class or working problems on the board. By the end of the year I was volunteering to work up on the board, eagerly solving challenging problems. MPI has done so much for me, and I'm hoping it will never go away.

- The further I get away from it the more I appreciate it.
- To whoever may read this and is in a position of power on the funding of this program: PLEASE DO! This program is doing a vital service to the districts and students participating and it SHOULD and must continue.

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#### ENRICHMENTS

Some reports of past enrichments:

On Feb. 17, Dr. Quinton Bowles from UMKC's Mechanical Engineering Program spoke to us on 'Strength of Materials', after which we took a brief tour of his laboratory.

March 2 brought 82 year old Eilene Galloway, an international expert on space law and a woman of many accomplishments both within and without government, who has received a number of lifetime achievement awards, including NASA's Public Service Award and Gold Medal in 1984. She spoke, among other things, about the history of the space program, and the current (1988) treaties between the US and the USSR for cooperation in space. Our students seemed quite impressed by her record, and her presence.

On March 16, Dr. Larry Campbell, the chairman of the Mathematics and Physics Department of the School of the Ozarks was enthusiastically received for his

talk about 'Interesting and Weird Mathematicians', in which he traced some of the mathematicians in history since Thales, surprising many of our students with unusual anecdotes and stories about these most curious men and women.

(As a side note, Larry's talk inspired Tonia Carter, one of our students from William Chrisman High School, to do a research paper on a modern 'interesting and weird' mathematician. After consulting the recent book, 'Mathematical People', she has chosen to write about Dr. Raymond Smullyan, a mathematical logician, and former magician!)

March 30 brought Paul Wolfe, the Coordinator of Student Services for the Computer Science Program of UMKC, who spoke about what Computer Science is today, what UMKC's new CS Dept. is like, and where both are headed in the future.

#### UPCOMING ENRICHMENTS:

A speaker for April 13 is not yet scheduled, but on April 27, as promised in the last newsletter, Dr. Bruce Barker from the UMKC School of Dentistry will visit us once more to discuss 'Diseases of the Oral Cavity', specifically touching on hepatitis, herpes, and AIDS.

On Sunday May 8 we will make our annual trip to Worlds of Fun, where for about half the day our students will perform physics experiments directly connected to certain rides, and enjoy the rest of the time on their own. The MPI provides tickets for all, and the assignment is part of their Physics grade.

We still hope to tour the GM Fairfax plant in May, though it is

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still not clear when tours will be allowed.

The FINAL EVENTS for this year will include our yearly Picnic/Breakfast held on the morning of May 26 in McCoy Park, just across Highway 24 from the Truman Library, and our Awards Presentation on the morning of Friday May 27, at the MPI. During the former we'll eat a hot breakfast cooked on the spot, and may even play a little softball, while the latter is our chance to reward some of our best students for their year-long efforts in this strenuous program.

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MATHEMATICS AND SCIENCE VIDEOTAPES  
-- OUR GRANT IS RENEWED --

The Missouri Coordinating Board for Higher Education has renewed our grant to create a number of videotapes of speakers presenting talks devoted to science or mathematics. As we reported in December, we have sent out our master tapes to over 125 interested high schools in Missouri, for them to copy and return to us. We presently have 8 videotaped presentations and hope to add at least 8 more to that number by the time our renewed grant expires in December of this year. We'll keep you posted.

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SOME FINAL QUOTES  
FROM OUR 1987-88 STUDENTS

"The Institute has helped me most in the way I approach and try to solve problems. It has also helped me realize just how practical Calculus and Physics is in the real world."

Jason Stabenow  
Fort Osage High School  
Fort Osage District  
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" 'Don't waste your time doing anything that will be of no use twenty years from now.' Who said that? Well, I did. What it means to me is for us to do things that will benefit us in the future. And I whole-heartedly believe the Institute will do just that. It is showing me what college is truly like and how to cope with it. I almost didn't come here, but I'm glad I did because if I hadn't, I know I would not be ready for college."

Reese Isbell  
Van Horn High School  
Kansas City, MO. District  
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"The Mathematics and Physics Institute has been a good experience because it has cut me down to size. It made me grow up and realize that life is not all fun and games, and that school requires hard work. I think that I'm going through my 'college freshman crisis' a year early, so I will be well-prepared next year."

Jim Cady  
Truman High School  
Independence District  
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"It has been a busy and challenging, yet profitable and sometimes exciting year at the Mathematics and Physics Institute. There were days when I came to class with half-opened eyes, and evenings and weekends when I had to stay up late and did nothing but Calculus or Physics. There were times of intense concentration and of disappointments. Yet there were also times of satisfaction and I would feel very regretful if I couldn't have been in this program, for it offers much more than my high school can in regard to physics and mathematics. The MPI also has enrichment days when

subjects other than Physics and Calculus are presented. Together with its challenging atmosphere, the MPI gives me a head start on getting a college education."

Hien Tran  
Northeast High School  
Kansas City, MO. District

A SOLUTION TO  
MATHEMATICS CHALLENGE #4

Recall the problem statement:

What is the largest positive integer  $N$  for which

$$N^3 + 100$$

is divisible by  $N + 10$ ?

SOLUTION:

If we first simply divide

$N^3 + 100$  by  $N + 10$ , we can write:

$$N^3 + 100$$

$$= (N + 10)(N^2 - 10N + 100) - 900.$$

So, if  $N + 10$  is to divide (without any remainder) into

$N^3 + 100$ , then it must also divide into 900. For  $N$  to be as large as possible, we must then have  $N + 10 = 900$ , meaning  $N = 890$ .

[This appeared as problem #5 on the 4th AIME (American Invitational Mathematics Exam), in 1986.]

MATHEMATICS CHALLENGE #5

Prove that:

$$n! > 1 \cdot 3 \cdot 5 \cdot 7 \cdots (2n - 1),$$

for all positive integers  $n \geq 2$ .

!NOTICE!

\* The August 1 newsletter will report on the MPI's top ten students and on our Awards Presentation, as well as give IMPORTANT INFORMATION for our 1988-89 STUDENTS! Until then...

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The MPI Newsletter is published five times a year on the first of the month during the months of August, October, December, February, and April at The Mathematics and Physics Institute, 600 W. Mechanic, Independence, Mo. 64050, phone (816) 276-1272. Please address all correspondence concerning this newsletter to 'Newsletter'.