

YEAR 9 - IN BRIEF

Currently enrolled in the MPI are 55 students, 52 in Calculus and 54 in Physics, from Fort Osage (8), Northeast (14), Truman (13), Van Horn (6), and Wm. Chrisman (14) high schools. Of these, 29 (53%) are women, and 14 (25%) are minorities. This is the first year we've had over half women!

! MPI OPEN HOUSE !

Sunday Nov. 8, from 2-4 pm, the MPI will hold its annual OPEN HOUSE for parents, teachers, counselors, administrators, and anyone else interested in talking to the faculty, staff or students of the MPI.

We'll be in the Truman Campus Building of UMKC behind the Truman Library just north off Hwy 24 in Independence. Several rooms will be organized with 1.) physics demonstrations and laboratory equipment, 2.) mathematics demonstration problems on chalkboards with videotapes of recent problem-solving sessions, and 3.) the MPI Calculus Lab in Room 223 will be open with MPI student assistants ready to demonstrate mathematics software to our visitors. In Room 207 "The Loft", at 2:30 pm, the MPI director will make some brief remarks and introduce the MPI teachers, and a 10-minute slide presentation will follow. And of course, there will be refreshments (!). If you have any questions, please call 235-1272. You're invited!

! MPI OPEN HOUSE !
SUNDAY NOV. 8, 1992, 2-4 PM

CALCULUS LABS REPORT

Having an MPI calculus laboratory has made the transition for our students from a traditional American summer of NO mathematics to the fast pace and high expectations of MPI calculus a bit smoother this year. The early lectures and homework on pre-calculus topics,

TO ALL MPI ALUMNI:

HAVE YOU GRADUATED
FROM COLLEGE?

IF SO:

PLEASE CONSIDER JOINING OUR
PANEL DISCUSSION THIS YEAR!
(Tues. Jan. 5, 1993)

CALL (816) 235-1272

acclimatization to the MPI learning environment, and learning DERIVE have, we hope, blended together to more effectively ready our Year 9 class for the rest of the MPI year. For instance, last year after 4 full weeks of MPI classes most students had had only 3 computer lab days with DERIVE; this year most students will have had 5 such days. Also, the introductory calculus labs have been redesigned to quickly guide (again, we hope) even those with the least computer experience up to a working level of competence, while reviewing necessary background mathematics. With the additional presence of an MPI computer, identical both in hardware and software to those in our new laboratory, on-site at each of Fort Osage, Truman, and Wm. Chrisman high schools, as well as a computer loaded with DERIVE reserved at Northeast high school for MPI students, and a similar arrangement being negotiated at Van Horn high school, we are able to give effective homework assignments that may realistically require computer use.

It has, however, become clear that a substantial redesign of our calculus course is in order, both to reflect the new tools to hand, and the increasing national movement toward calculus reform. For example, the calculus laboratories we now use have come from two published DERIVE calculus manuals, a variety of other sources, and several are MPI originals. This is all unwieldy. The sensible thought is to compile

our own lab manual, and we are now discussing this.

In short, this is only a beginning; it is still too early to assess the effect these fresh arrangements will have on the analytical abilities of our students, which is after all the goal. This column will attempt to keep you advised of our progress.

TO ALL MPI PARENTS

Do you wonder where your children are at 6:30 am? I have found many of them working diligently in the MPI computer laboratory. They are learning to use the computer so they can solve difficult analytic geometry and calculus problems, acquire and analyze data for physics laboratories, write laboratory reports, and prepare themselves for college. Every morning during our first two weeks from seven to twelve students have arrived at least a half hour before class, and on several occasions several have come back after their high school classes to work with the computers.

I can't tell you how proud I am of them! This extra effort demonstrates their sincere desire to learn and the high priority they are placing on a quality education. We at the MPI appreciate the support and encouragement you have given these exceptional young people, your children.

Richard Waring
Director

MATHEMATICS TECHNOLOGY WORKSHOPS

So far this semester the MPI has held two afternoon workshops for high school teachers from Truman and Wm. Chrisman High Schools to learn the mathematics software DERIVE. The response has been positive, and since our new computer lab is largely idle during the afternoon, we hope to hold even more impromptu sessions for any high school teacher interested in DERIVE or any other software we have available. Contact one of the MPI teachers or call the mathematics coordinator at 235-1290 for more information.

For those further interested in mathematics technology, whether it be software or graphics calculators, the

Second Annual Greater Kansas City Area Mathematics Technology Expo, sponsored by KRCHE (Kansas City Regional Council for Higher Education), will be held at Kansas City Kansas Community College on Fri. Oct. 16 and Sat. Oct. 17. For further information call KRCHE at (913) 341-4141.

ENRICHMENTS

PREVIOUSLY

On Sept. 18 Augusta Nichols of UMKC's Academic Support Services, and the mathematics coordinator gave 50 minute lectures on NOTE-TAKING and READING A TEXTBOOK. Here are some selections from student comments about those talks:

--Note-Taking--

--She did a good job of taking an important, but dull subject and making it palatable, even entertaining. Thanks for your time, Ms. Nichols.

--The only improvement would be to make it a little more specific to calculus/physics note taking, i.e. to make suggestions on how to interpret a lecture and not symbols in writing it down.

--Reading a Textbook--

--I liked the advice he gave us about writing down notes on the right column of the pages in our text. There isn't really anything as far as I'm concerned that he could have added to this lecture to make it better.

--It was ok, there isn't much you can do to liven up an introductory session to the great wide world of MPI textbooks.

UPCOMING

Oct. 2 will see the return of Ed Kiker, a Harvard graduate who majored in Lunar Geology, former Alaska State Director of Project High Frontier, and a member of the National Space Society. He is currently director of OSIRIS (Outer Space Industrial Resources Investigations Systems: International Space Consultants). His talk is entitled: RETURN TO THE MOON: WHEN AND WHY.

On Oct. 16 Frank Booth, a forensic chemist with the Kansas City Regional Crime Center, will return with his stimulating talk: SCIENCE IN THE CRIME LAB. Every year his is a favorite talk, revealing a glimpse of the art of scientific crime detection and solution. Sherlock Holmes would certainly approve.

Henry Mitchell, a UMKC biologist, Associate Vice-Chancellor for Academic Affairs, and well-known authority on bats, will return on Oct. 30 with his popular talk: BATS, STRANGE CREATURES OF THE NIGHT. This is his seventh visit to the MPI, and the first since his recent illness. We enthusiastically welcome him back, appropriately close to Halloween, and hope he will once again be able to bring a live bat.

Finally, on Nov. 13, the MPI will make its annual all-day field trip to the nuclear Research Reactor in Columbia, and while there also visit the MU physics department. Our students always find this bus trip a welcome break from classes.

PAST STUDENTS WRITE TO US

KIMBERLY (GALLAGHER) BROX (86-87)
(BS History)

"Dear Friends,

Hope you have had a good summer and all have returned to school in good shape. The August Newsletter was a thrill to receive and brought back good memories.

Since the January reunion I have received teaching certification in Math, Physics, Chemistry, and Biology. I truly feel the MPI experience helped me to land my first teaching position as Physics and Algebra II teacher for Seaman School District in Topeka. This afternoon I met another math teacher who had applied for my job, and he is 52 years old with both certifications. I was really shocked, but I know MPI made the difference.

Thank you for putting the sources of the challenge problems in the Newsletter. I've been looking all over for really unique problems to use in the classroom.

Take care and good luck in the coming year!"

ALAN CANFIELD (86-87)
(BS Mechanical Engineering)

"I couldn't help reading the MPI bulletin board, and I was excited when I saw the "Honor Roll". It is nice to know you all have kept such good track of the graduates. Some names on there bring back memories.

I have enclosed my business card, for each of your collections.

I have started on graduate courses here at UMKC in Mechanical Engineering after being accepted into the MS program. Let's say I have memories that should keep me motivated. Hope the program is going well."

FIRST IMPRESSIONS FROM THE STUDENTS OF YEAR 9

"MPI is a very accelerating and intensive program that has increased my educational motivation to excel. The program provides students an environment where learning skills vital to success in the future are the main focus. I truly believe that my experience at MPI this year will be one of the greatest tools for college."

Serena Lowe
Ft. Osage High School
Ft. Osage School District

"Ever since my counselor sponsored a field trip to the UMKC-Truman Campus, I knew that I was going to attend MPI. This was two years ago when I was a sophomore. Now I'm here and I'm excited. MPI is very challenging. I will benefit from these classes and the teachers."

Diana Dang
Northeast High School
Kansas City School District

"My first impression on MPI was not that interesting, and it was like taking another class. But as time passed by me - just 3 weeks - it was a whole different story as day by day

I need to study every night for reviewing and studying.

Now, I strongly feel that MPI is not like regular class and all MPI students are something special than other students. I'm proud of myself to be in MPI. Also MPI will be my first step to college courses."

Steve Lee
Truman High School
Independence School District

"The first couple of days were a bit overwhelming, but I've gotten a little more used to the fast pace now that I've been here a while."

Stacie Cole
Wm. Chrisman High School
Independence School District

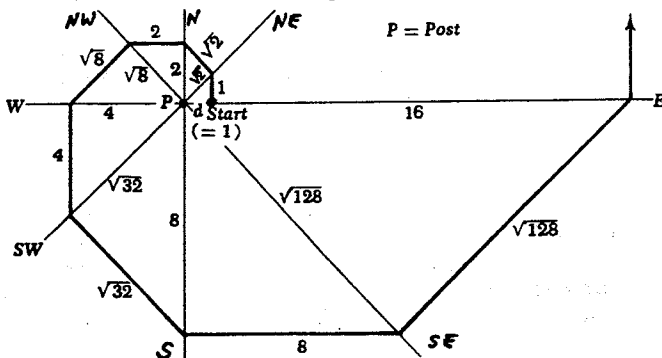
**A SOLUTION TO
MATHEMATICS CHALLENGE #24**

Recall the problem statement:

A man is standing in a flat field, 1 rod (more than 5 yds.) due east of a post, and facing north. He walks straight north until he is directly northeast of the post; then--always in a straight line--he walks northwest until he is directly north of the post; then west until he is northwest of it; then southwest until he is west of it; and so on, in a kind of segmented spiral. When he is again due east of the post, how many rods is he from it? Give the formula, with D = distance from post in rods, and N = number of segments walked.

SOLUTION:

Plotting the man's path we arrive at the figure below:



If we then create a table of D and N values, we have:

D	$\sqrt{2}$	2	$\sqrt{8}$	4	$\sqrt{32}$	8	$\sqrt{128}$	16
N	1	2	3	4	5	6	7	8

This suggests the general formula:

$$D = (\sqrt{2})^N = \sqrt{2^N}$$

So, when the man is once again due east of the post, he has traversed 8 segments and so is

$$D = \sqrt{2^8} = \sqrt{256} = 16 \text{ rods distant.}$$

[From: Mathematical Brain Benders by Stephen Barr]

**A SOLUTION TO
PHYSICS CHALLENGE #15**

Recall the problem statement:

Some spectators and players claim that some pitched baseballs swerve drastically just before reaching home plate. Is this sudden deflection possible?

SOLUTION:

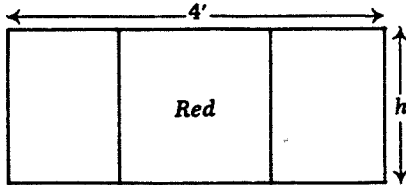
A spinning baseball curves because of the difference in pressure between two opposite sides. This pressure difference gives the ball a constant acceleration 'a' in a direction perpendicular (hopefully) to the line of flight. Therefore, the deflection is given by $d = 1/2 at^2$, where t is the time it takes the ball to reach the plate. In fact 50% of this deflection occurs in the last 30% of the total time.

In addition, for those standing behind the plate, the visual perspective tends to exaggerate any observed deflection.

[From: PASCO Scientific Lab Notes]

MATHEMATICS CHALLENGE #25

Stacie wants to design a flag to hang on her door. The door is 4 ft. wide, and the design will be a red square on a white background, but the white background will only appear at the sides, as in the figure below:



How big should the red square be to give the greatest area of white on the sides? (Remember, the width of the flag must be 4 ft.) In particular, WITHOUT using calculus, what value of h gives the maximum white area?

[From: Mathematical Brain Benders by Stephen Barr]

PHYSICS CHALLENGE #16

Medium Fast Physics

An object is in motion through a stationary medium. If the surrounding medium were absent, the object would continue moving indefinitely at the same speed. However, because of the energy lost due to friction with the medium, the object speeds up. How can this be possible?

[From: PASCO Scientific Lab Notes]

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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) 235-1272. Please address all correspondence concerning this newsletter to 'MPI Newsletter'.
