
THANKS FROM THE DIRECTOR

Our annual open house on Nov. 6 was attended by thirty parents and school administrators and several of our MPI students and staff. I want to thank each of those attending this event. As a parent, I know it is many times inconvenient to attend many school functions. By taking the time to attend this kind of event you are demonstrating to your son or daughter your interest and concern for their education. Your support has a much greater effect in establishing priorities and molding the goal than you might imagine.

Just last week I read an alarming report by a National Commission which concluded that 50% of the young people between the ages of 16 and 24 will not have the basic skills necessary to gain meaningful employment. We believe everyone should have a solid background in mathematics and an interest in and knowledge of their physical environment (physics). However, the development of reasoning skills, study habits, and problem solving strategies and abilities are our highest priority at the MPI. It is these qualities which carry over to other disciplines and are essential for every productive individual.

Taking your time to attend our open house gives a positive message to your child. With your continued support and encouragement, I am confident they will become productive and contributing members of our society.

I also want to thank the students who served as greeters and photographers, or explained laboratory experiments, helped with demonstrations, worked calculus problems and explained videotapes. Without their help, we couldn't have had our open house.

Richard Waring
Director

OUR HIGH SCHOOL TEACHERS 1988-89

Every year three mathematics teachers from each state and four jurisdictions are recognized as finalists in the Presidential Awards for Excellence in Science and Mathematics Teaching (PAESMT) program. This year our MPI mathematics teacher from William Chrisman High School, AL MORSE, became one of the finalists.

Al will receive a certificate of honor from the National Science Foundation and the PAESMT recognizing his superior efforts to improve students' understanding of mathematics, his command of the subject, and his professional leadership qualities.

We are very proud of both Al and our previous Presidential Award winner from Truman High School, Sheri Adams, for their excellent work and their contribution to the MPI program since we began in 1984.

MPI GOES TO THE TEAMS TESTS!

This year for the first time the MPI is entering a team of students in the annual TEAMS

competition (Tests of Engineering Aptitude, Mathematics and Science), created by the Junior Engineering Technical Society (JETS) and held all over the US in February and March. We will be entered in the category for schools with either a population of 2000 or more, or 'selective' in the sense that admission is based in some way on academic criteria. This will be stiff competition for our small population of 55 students, but we hope to do well.

The competition will be held at the UMKC Truman Campus sometime between Feb. 11 and Mar. 25, 1989. The six subject areas covered by the tests are: Biology, Chemistry, Computer Fundamentals, English, Mathematics and Physics. Each student must be entered in two tests and each team must provide at least two students for each test.

Our first MPI team and alternates (the specific tests each will take will be decided later) are:

Anthony Aguilera
Jeff Coleman
Brian Edgar
Jon Fox
Jim Hitchcock
Dean Keeling
Andrea Linville
Seth McMenemy
Tammy Phelps
Mike Schmidt

WORDS FROM A COLLEAGUE

Planning for the MPI began in August 1983, a full year before the first students entered our classrooms. I recall thinking the program was a sound and wonderful idea for the students of the participating districts. This was to be a challenge to gifted

students. It was to be a reward to those who had worked hard to earn prerequisites to enter the program. These things I knew were true. What I hadn't considered was the tremendous impact the program would have on its instructors.

My colleagues at the MPI are among the best mathematics and physics teachers in the metropolitan area. I have gained as a classroom teacher because of my interaction with these teachers. We share ideas, strategies, and materials that assist us in our high schools as well as at the MPI. I have experienced biweekly enrichment speakers who are superb. Of course, I have learned from the many gifted students whom I have taught in the past 4 1/2 years. Richard Waring and Richard Delaware have encouraged us to attend workshops and conventions which are crucial to our being updated on developments in our fields.

MPI students are fortunate to be a part of the program; additionally, the staff is fortunate to be a part of this program.

Sheri Adams
Mathematics Teacher
Truman High School

UPCOMING ENRICHMENTS

On Dec. 7, Dr. Charles Wurrey, a consultant for the EPA and professor of Chemistry at UMKC will speak to us on Dioxin problems in Missouri.

Dec. 16 will be the last class day at the MPI until January 3, and will see our Christmas party featuring musical (and other) acts by students.

Following Christmas break, on Jan. 4 we'll hold our annual Panel Discussion and Reunion. The panel will consist of previous MPI students who will share with us their observations of college life and the pursuit of a major.

On Jan. 18, Dr. Bruce Barker from the UMKC Dental School will once more present his talk on Diseases of the Oral Cavity, specifically: Hepatitis, Herpes, and AIDS.

Finally, on Feb. 1, Dr. Larry Campbell from the School of the Ozarks will enthrall us with his historical talk: Interesting and Weird Mathematicians.

THE MPI TEACHING LOG

How long would it take for a man to crawl to the moon (in days)?

How many hairs cover the body of a typical human being?

How many dollar bills would it take to make a stack the height of Mt. Everest?

These are all examples of physics problems known as Fermi problems, after the famous nuclear physicist Enrico Fermi. The object in all of them is to estimate to the nearest power of 10 the answer to the question posed.

In physics a student needs to develop a firm, visceral grasp of magnitude in order to interpret mathematical results and to reason about physical questions. These Fermi problems fix these ideas in vivid images, and so give focus to mathematical manipulations of physical formulas.

MORE STUDENT QUOTES, 1988-89

" To me the MPI program is like an introduction to what college is like. It's preparing me by giving some information of how to take notes, study and how to use time wisely. It's also a place to further enhance my knowledge. I hope this program will continue to teach anyone who wants to receive this new and useful information."

Ngoc Tho Doan
Northeast High School
Kansas City, MO District

" My decision last year to attend the MPI was a difficult one. I was scared that I would not succeed and worried that I would have no fun. I have been proven wrong in both aspects. With a lot of studying, I've done well in Calculus and Physics, and I am actually enjoying the experience. I learned that with some self-discipline I can do well and have a good time in the process."

Cindy Roby
Wm. Chrisman High School
Independence District

" The Institute has given me confidence to pursue careers I WANT to pursue. I originally wanted to become an M.D.; now I've decided to pursue a doctorate in Astrophysics (probably). If I can handle here, and high school, I can handle a university."

Jon Fox
Fort Osage High School
Fort Osage District

" The MPI gives us an understanding of what college classes will be like. The two courses we take here are given to us at a more advanced rate than

our high school courses. Although we get college credit for these courses, I did not take them because of that. I have taken these courses so I can go to college with a knowledge and understanding of college life. I am looking forward to the rest of the year."

Brian Edgar
 Van Horn High School
 Kansas City, MO. District

where in the second numbering we are taking into account barren trees with ZERO leaves.

Since there are MORE than N trees in all, under the first numbering the Pigeonhole Principle provides a TRUE answer to our question, meaning there must exist at least two trees with the same number of leaves (i.e., occupying the same 'pigeonhole'.) However, under the second numbering the answer may be FALSE if there are exactly N + 1 trees.

A SOLUTION TO
 MATHEMATICS CHALLENGE #7

If there are more trees than there are leaves on any one tree, then there exist at least two trees with the same number of leaves. True or False ?

SOLUTION:

This solution illustrates the Pigeonhole Principle (also known as Dirichlet's Principle), a surprisingly powerful idea which in one form says that if more than N pigeons are put into N pigeonholes, then at least one pigeonhole contains at least TWO pigeons.

In our question there are two interpretations and hence two answers. Suppose N is the largest number of leaves any one tree can have, and let all possible numbers of leaves a tree may have be the 'pigeonholes'. The two interpretations arise from the following two possible numberings:

1, 2, ..., N (only N pigeonholes)

and

0, 1, 2, 3, ..., N (N + 1 pigeonholes)

MATHEMATICS CHALLENGE #8

Prove the inequality:

$$x = \frac{1}{2} \cdot \frac{3}{4} \cdot \frac{5}{6} \cdot \dots \cdot \frac{99}{100} < \frac{1}{10}$$

Editor/Writer: Richard Delaware

Contributing Writers:
 Sheri Adams, Richard Waring

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 'MPI Newsletter'.

!MERRY CHRISTMAS!