



THE DIRECTOR THANKS OUR GUESTS

Our annual open house on Nov. 5 was attended by forty-one 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 often 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 career goals than you might imagine.

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, explained laboratory experiments, helped with demonstrations, and worked

calculus problems. Without their help, we couldn't have had a successful gathering.

Richard Waring

THE MPI GETS A COMPUTER!

In the last two months we have finally put together a small computer system for the MPI. It includes an Eltech 386-type IBM-compatible machine with a 14" color monitor and VGA graphics, 1 megabyte (MB) of RAM (Random Access Memory), a 40 MB hard drive, a 1.2 MB, 5 1/4" floppy drive, a 1.44 MB, 3 1/2" drive, an Epson dot matrix printer, and an HP color plotter.

We are still surveying the vast literature on software, but currently have MSDOS, GWBASIC, WORDPERFECT, and are considering MATHCAD, DERIVE, IBM TOOLKIT, etc. as major purchases, as well as a whole collection of smaller, cheaper, and more specific mathematics and physics packages.

We hope to incorporate this machine into our classes soon for demonstrations (some exploration) while the faculty use it as a tool to teach ourselves how to more completely infuse computers into our courses, wherever they can be most enlightening. We'll keep you posted.

PHYSICS IN ATLANTA

Once again, as is our policy here at the MPI, we are sending some of our teachers to a national conference to update their

knowledge of new pedagogy and tools in their field, and to confer with their fellow professionals from across the country.

This year it is the turn of the MPI physics teachers Calvin Nelson (Northeast Magnet High School), Larry Harding (Ft. Osage High School), and Richard Waring (UMKC) to go. They will be attending the AAPT (American Association of Physics Teachers) convention being held in Atlanta, GA, Jan. 20-25, 1990. In particular, they plan to examine the best of physics software for future use here at the MPI on our new computer.

ENRICHMENTS FOLLOW-UP

Our Oct. 25 Enrichment, Science in the Crime Lab, with Frank Booth of the Kansas City Regional Crime Lab had its surprising moments: spent 38 and 45 caliber bullets were passed around, an apparently clean piece of carpet was sprayed with Luminol and in the darkened room images of bloody feet could be seen glowing on it, and we learned of such oddities as the use of super glue vapor to reveal fingerprints, and that a person's DNA will eventually be read from a paper sheet like a supermarket bar code!

Our schedule was altered in November since the Columbia research reactor turned out to be closed for maintenance on Nov. 8, our planned date. Instead, on that day Dr. Paul Bryant of the UMKC Physics Dept. spoke to us about the latest scanning-tunneling electron microscopes in his talk: Atomic Force Microscopy. UMKC received its first such instrument in 1985, and since then has been on the edge of research into refining the technique. Currently the magnification allows images of

single atoms(!) on the surface of a conducting material to be displayed. The technique is also now being expanded to biological materials which do not in general conduct electricity. (Yes Virginia, it IS possible to 'see' an atom.)

On Nov. 22 we finally visited the Research Reactor in Columbia, as well as the MU Physics Dept. to sample some of their latest research projects.

Dec. 6 brought Sam Gill who spoke to us about critical thinking and the need to examine the evidence for our beliefs in a talk entitled: Unsolved Mysteries and Extraordinary Phenomena. This year we gathered some data of our own from our students and faculty in a 54 question questionnaire addressing their belief in UFOs, strange beasts, pseudoscience, etc. Some of the results were quite unexpected, adding a dash of immediacy to Sam's talk.

UPCOMING ENRICHMENTS

Dec. 15 will see our annual Christmas party in which our students will show off some of their musical and dramatic talents, and we'll all eat Christmas foods.

On Jan. 3 we will host the annual MPI Reunion and Panel Discussion. Students from past years will sit on the panel and pass on to this year's class their first-hand experiences in college and elsewhere.

Other speakers for next semester are not confirmed yet, but we will certainly be hearing a highway engineer, possibly a scientist from NASA, Dr. Ching on Superconductors, and we hope to take a field trip, perhaps to the GM Fairfax plant again.

MORE STUDENT QUOTES

"The Institute is a unique experience for high school students. It's different from a high school class in that it's taught on campus by a college instructor. The course is more demanding than a college level course taught at a high school. It is the most challenging (and the most rewarding) class I have had in high school."

Shane Henry
Ruskin High School
Ruskin School District

NOTE: Shane is taking only Calculus I and II.

"MPI is the greatest thing that has happened to me while in high school. This program will help me to adjust to the college atmosphere while at the same time gain college credit. With this experience I think the transition from high school to college will be easier and I will be more successful in college."

Chris Walker
Northeast High School
Kansas City, MO District

"MPI is an excellent program. The classes we are taking are more difficult than high school classes, but in the long run, they will be more rewarding."

Tracey Sterbenz
Fort Osage High School
Fort Osage District

"I think I have learned more in one quarter of MPI classes than in most semester classes. The quicker pace makes the classes more challenging. It's tough, but I just hang in there and tough it out. Also, the enrichments offer

us a break from the normal procedure."

Danny Porter
Wm Chrisman High School
Independence School District

A SOLUTION TO
MATHEMATICS CHALLENGE # 11

Recall the problem statement:

A friend of yours has a small opaque bottle containing 2 green olives and five black olives. The neck of the bottle will allow only one olive out at a time. He bets you that if you shake the bottle and then try to roll out the olives, you can't roll out the first three olives without getting a green one among them. Should you take the bet?

SOLUTION:

NO. The chances that you could roll out three olives without getting a green one are too slim for you to take the chance, as we'll see.

To roll out three olives without a green one among them is of course to roll out three black olives in a row. Since each release of an olive is independent of every other release, we can multiply the probabilities of getting a black olive in each of the first, second and third releases. The probability of getting a black olive first is $\frac{5}{7}$ since there are five black olives in all and a total of seven olives in the bottle. The probability of getting then a second black olive is $\frac{4}{6}$, since one black olive has already been released. Similarly the probability of getting a third black olive is $\frac{3}{5}$. Multiplying

these together yields 2/7 as the probability that you win, about 28-29%. The odds are definitely NOT in your favor.

A SOLUTION TO
PHYSICS CHALLENGE # 1

Recall the problem statement:

About three-fourths of the earth is covered with water. Imagine the earth reduced to the size of a billiard ball and dried with a towel. If you run your fingertips over the surface, would you be able to feel its mountains and ocean floors?

SOLUTION:

NO. In fact, the earth would feel even SMOOTHER than a billiard ball!

The earth has a diameter of about 41,712,000 ft., while the highest point above the earth's surface is 29,078 ft. (Mt. Everest), and the deepest point in the oceans below the surface of the earth is about 35,820 ft. (The Marianas Trench in the Pacific). Were these two landmarks adjacent, this would make for a maximum span of about 64,898 ft. from lowest to highest point, approximately .155 percent of the earth's diameter.

Now, .155 percent of the diameter of a billiard ball (about 3 in. = .25 ft.), is approximately $\frac{5}{1000}$ of an inch, for the LARGEST possible ridge on the surface!

It seems the earth is much larger in comparison to its surface features than we are accustomed to imagine.

PHYSICS CHALLENGE # 2

Suppose an astronaut in zero gravity uncovers a glass of water and wants to empty the glass quickly into the air. Describe THREE different ways he can do this by using the water's inertia.

Editor/Writer: Richard Delaware

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! MERRY CHRISTMAS !