MPI

The Mathematics and Physics Institute NEWSLETTER

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GOODBYE TO YEAR 6

This has been a fresh year for the MPI: a new computer, allowing us more flexibility and control over paperwork as well as the rich possibilities of educational software for calculus and physics; continuing improvement of teaching methods, in particular multiple one or two question quizzes throughout the year; and a strong class of students. We look forward to Year 7 as we examine state-of-the-art techniques for making the best use of technology, and even an innovative integration of physics with calculus being tested in Colorado. We intend to ride the current wave of national interest in science and mathematics education and continue to create a unique alternative for the best students. To all of you who have supported our efforts we once again offer our thanks.

WINNING STUDENTS

At the TEAMS competition, mentioned in the last issue, Mike Gish received third place in the Computer Fundamentals Test.

With Wm. Chrisman High School's participation in several Math Relays came several awards for some other MPI students: Danny Porter placed in the top 5 in several different events, his team placing 2nd in computers at the KCATM Relays, and he was the top senior at the Blue Springs Relays. Rick Trimble and Mike Gish took 2nd as a team on Math Proofs at CMSU, and Rick was also on the Calculator team that took first at the KCATM Relays. Jamy Bacchus had two 3rds and a 4th at the Excelsior Springs Relays, while at same contest, he, Mike, and Rick landed 2nd Place with their senior team.

Congratulations to them all!

PAST STUDENTS WRITE TO US

DOUG BULLOCK (84-85)
(Graduate Student in Mathematics)

"After 5 years of college, MPI, I think, is still one of the more rewarding experiences I have had in my education. Keep it up!"

PAM DETERS (84-85)
(Software Representative)

"I loved the MPI - the fun times - the hard work - the friends - Best experience in high school and greatly affected my life by influencing where I went to college, what my major was (computer science), who my friends are, why I am who I am."

BRENT HARDING (84-85)
(McDonnell-Douglas Space Systems: system engineer)

"...valuable exposure to college-level coursework..."

SARAH LITTLEWOOD (85-86)
(Math & Physics major)

"I didn't feel like a freshman when I entered college. I already knew how to study..."

DOUG PALMER (85-86)
(Accounting Major)

"...taught me how to work with others on various projects. The MPI enabled students to work together in groups, and this was extremely valuable in my particular major."

SUZANNE BRESHEARS (86-87)
(Biology Major)

"The excitement that the professors showed helped me get excited about learning in general...The personal attention and enrichment...were an excellent way to make the program a broad, inclusive educational set-up."

EDITH DUNBAR (86-87)
(Elem. & Special Educ. Major)

"...MPI has prepared me for anything that college throws my way. After attending the MPI, I feel as if there is nothing that I can't do."

JEREMY WHITE (87-88)
(Elec. Eng. & Comp. Sci. Major)

"I'm attending an engineering school that usually takes 9-10 semesters to overcome. With MPI, I'm looking at 7-8 and possibly a double major."

RUSS BROWNING (88-89)

"The MPI taught me to study concepts instead of just formulas. It is a great program for the more intellectually advanced students."

READINESS EXAMS

During the first two weeks of May the MAA (Mathematical Association of America) Calculus Readiness Exam will be given at each of the high schools participating in the MPI program. Here is some data from the past few years:

Year	Taking	Passing	% Passing
84-85	?	73+	-
85-86	116	86	74%
86-87	113	71	63%
87-88	107	82	77%
88-89	93	59	63%
89-90	107	70	65%

ENRICHMENTS

On Feb. 7 we toured three Mechanical Engineering labs at UMKC under arrangement with Dr. Quinton Bowles: we saw metals fracture under thousands of pounds/square inch of pressure, a housefly coated with gold atoms under an electron micro-scope, and the fine grain structure of materials.

Engineering Professor George Hauck took us through the reconstruction in Parkville of an historic Waddell-designed bridge via a videotape and slides on March 7.

We boarded buses on Thurs. March 22 to visit and tour the state-of-the-art GM Fairfax Automobile Plant: the giant stamping presses, the clean room for painting (which we could not enter), the tolerance testing room (built on slabs of granite above 7 1/2 feet of concrete forming a still, level surface), and the vision of partially completed car bodies traveling about by themselves on self-contained carts guided only by computer commands arriving through a cable embedded in the floor.

UPCOMING ENRICHMENTS

Apr. 4 we'll see a 25 minute History of Mathematics film, on Non-Euclidian geometries, and a 30 minute videotape about the GM Sunraycer, its winning solar-powered car.

Then, on Apr. 25, Dr. Bruce Selberg from the Aerospace Engineering Dept. of UM-Rolla will address: Careers in Aerospace.

May 9 will bring back Dr. Ching of UMKC's Physics Dept. for his cutting-edge report on Superconductors.

Sunday May 13 we'll take our annual trek to Worlds of Fun for a day of practical physics.

Later that week we'll finish off the year with our annual Picnic Breakfast on Thurs. May 17 in McCoy Park, followed by, on Fri. May 18, the last day of the MPI year, our Awards Presentation.

STUDENT QUOTES-LAST GASPS

"Enrolling in the MPI was a good choice. I'm learning new things, and I'm getting ahead of the 'competition'. I really like calculus and I'm making new friends. I like MPI!"

Ivan Bird
Truman High School
Independence District

"We have all seen the commercials for the Army, Navy, Air Force, and Marines, however, another branch needs to be created: MPI. The MPI is actually little more than 'basic training' for college and the real world. If one can rise to the challenge of the MPI (and get college credit), one can accomplish anything. Furthering the analogy, it is difficult to succeed at the MPI but not impossible."

ShawnFranssens
Fort Osage High School
Fort Osage District

A SOLUTION TO
MATHEMATICS CHALLENGE #12

Why must a house whose rooms each have an even number of doors likewise have an even number of outside entrance doors?

SOLUTION:

Each external door of the house has one side facing out, so we must show that there are an even number of door sides on the OUTside. If the house has N doors altogether, it has 2N door sides. The problem states that each room of the house has an even number of door sides facing INTO it. So, there are an even number, say 2K, of door sides on the INside of the house. The number of door sides on the OUTside is then 2N - 2K, which is an even number.

A SOLUTION TO
PHYSICS CHALLENGE #3

Everyone knows that the moon's gravity (sometimes assisted by the sun) is the major cause of tides, pulling the water of the oceans upward toward the moon in a bulge about a foot or two high.

But not many people know that at the same time there is also a 'high tide' on the side of the earth directly OPPOSITE the moon. What causes it?

SOLUTION:

The earth and moon form a "two-body" system which revolves about a common center. Because the earth is so much more massive than the moon, this center point is in fact INSIDE the earth. As the earth and moon swing around the center of their system, centrifugal 'force' causes the oceans to bulge upward on the side of the earth directly OPPOSITE the moon, producing a second high tide.

!NOTICE!

The August 1 newsletter will report on the MPI's top ten students for 1989-90 and on our Awards

Presentation, and contain as well IMPORTANT INFORMATION for our 1990-91 students.

MATHEMATICS CHALLENGE #13

For what positive integral values of n does $2n+1$ divide n^4+n^2?

PHYSICS CHALLENGE #4

When you turn on the hot water valve in your sink the flow rate slowly decreases and may even stop. This doesn't happen when you turn on the cold water. Why does hot water behave so badly?

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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'.