

THE WORLD SEEMS A NEW PLACE FOR YEAR 7

Our sixth year saw the structure of Europe and the Soviet Union fall apart toward a new equilibrium. One of the by-products of this momentous event is the joint publication by the US and USSR of a magazine for high school students of mathematics and physics, called QUANTUM (KVANT, in Russian). This year for the first time we will be requiring our MPI students to subscribe for the four issues to be published during the 1990-91 academic year, at a cost of about \$8.00. We plan to use the articles in both our calculus and physics classes, and hope that the presence of the magazine in our student's homes will spur their interest in both subjects.

Last year also, the MPI bought its first computer, an IBM-compatible 386/16 machine, with super VGA graphics. After a subsequent year-long search for and examination of mathematics and physics software, we are now prepared to use these new tools in selected parts of our courses. Our one machine will be used primarily for demonstrations and class preparation, but in agreement with the UMKC Coordinated Engineering Program, we will have limited access to their PC lab, consisting of nine 286 machines and printers. In calculus in particular, the experiment will be the use, by one section, of computer laboratory manuals recently published for the programs DERIVE, and True Basic's CALCULUS. If all goes well this year, and our budget holds, we hope eventually to have our own PC lab to use both for calculus as above, and during physics laboratories.

Finally, we thank all of our supporters over the last six years, especially the six classes of students who have passed through the MPI, and their parents. We hope to stay close to the cutting edge of educational reform in this country, by offering a solidly founded program for the best students.

STUDENT ORIENTATION SEPT. 5 - 7, 1990

Each year the first three days at the Institute are spent in giving our students an overview of how we operate, a discussion of our policies on attendance, grading, etc., and two diagnostic tests. Time is then set aside for the instructors to informally 'get to know' their classes before we all become preoccupied with classwork.

In particular, on the first day, Sept. 5, 1990, we'll provide each student with a packet of information and have each of them fill out a personal data form. This last requires that all students bring with them the following information:

Social security number.

Daily schedule of high school classes.

Schedule of extracurricular activities.

High school counselor's name.

Car license number, make and model, for those ever planning to drive to the Institute.

Ideas for Enrichment Speaker topics.

Otherwise, we look forward to seeing our newest class on Wed. Sept. 5!

CALCULUS II

Ivan Bird Truman

PHYSICS

| | |
|-----------------|--------------|
| Jamy Bacchus | Wm. Chrisman |
| Rana Barber | Wm. Chrisman |
| Ivan Bird | Truman |
| Kathy Bui | Northeast |
| Drue Cohoon | Ft. Osage |
| Duc Dang | Northeast |
| Mitch Dobson | Truman |
| Shawn Franssens | Ft. Osage |
| John Hooper | Truman |
| Curt Krause | Wm. Chrisman |
| Jeff Peterson | Truman |
| Hien Phung | Northeast |
| Tracey Sterbenz | Ft. Osage |
| Jeff Thate | Ft. Osage |
| Rick Trimble | Wm. Chrisman |
| Chris Walker | Northeast |

THE ANDERSON MEDAL

The MPI has been nominated for the prestigious Anderson Medal of the Business-Higher Education Forum. The award is based on four weighted criteria: Evidence of student progress, commitment to education reform, the scope of the program in relation to the needs of the community and society at large, and sensitivity to special-needs populations. The medalist and nine finalists will be profiled in a publication to be widely distributed in 1991. We hope for the best!

THE 1990 MPI AWARDS PRESENTATION

THE TOP 10 MPI STUDENTS OF 1989-90

Our final awards presentation was held on May 18, 1990, during which we were pleased to present many of our 1989-90 students with the following variety of awards:

We also honored the TOP TEN students (ranked according to their composite calculus and physics grade point averages) by giving them a one year subscription to Scientific American magazine:

TOP 10 MPI STUDENTS 1989-90

- | | |
|--------------------|--------------|
| 1) Tracey Sterbenz | Ft. Osage |
| 2) Jamy Bacchus | Wm. Chrisman |
| 3) Drue Cohoon | Ft. Osage |
| 4) Jeff Thate | Ft. Osage |
| 5) Rana Barber | Wm. Chrisman |
| 6) Chris Walker | Northeast |
| 7) Rick Trimble | Wm. Chrisman |
| 8) Mitch Dobson | Truman |
| 9) Ivan Bird | Truman |
| 10) Malissa Shrout | Ft. Osage |

Certificates for Outstanding Achievement (college grade of A or B) in:

CALCULUS I

| (Name) | (School) |
|------------------|--------------|
| Jamy Bacchus | Wm. Chrisman |
| Rana Barber | Wm. Chrisman |
| Mitch Dobson | Truman |
| Danielle Glossip | Wm. Chrisman |
| Shane Henry | Ruskin |
| Curt Krause | Wm. Chrisman |
| Malissa Shrout | Ft. Osage |
| Tracey Sterbenz | Ft. Osage |
| Jeff Thate | Ft. Osage |
| Shane Thompson | Ft. Osage |
| Rick Trimble | Wm. Chrisman |

Finally, we list here those MPI students planning to attend UMKC who received various scholarships from UMKC; included here are those students to whom the MPI awarded Chancellor's Scholarships:

UMKC Scholar's Award Winners:

Full Fees

Kathy Bui Northeast
 Danielle Glossip Wm. Chrisman
 Malissa Shrout Ft. Osage
 Chris Walker Northeast

One-half Fees

Thien Doan Northeast
 Tina Jenkins Ft. Osage
 Stephanie Reynolds Ft. Osage
 Hiromi Yokoyama Truman

UMKC Chancellor's Award Winners:

Amy Agee Truman
 Rana Barber Wm. Chrisman
 Shawn Franssens Ft. Osage
 Brian McBroom Ft. Osage
 Rick Trimble Wm. Chrisman

Alternates

Rachelle Durham Ft. Osage
 Hien Phung Northeast

UMKC Curators' Award Winners:

Mitch Dobson Truman
 Danielle Glossip Wm. Chrisman
 Malissa Shrout Ft. Osage
 Jennifer Sessa Wm. Chrisman
 Jeff Thate Ft. Osage

Junior Salamasina
 Khanh Tran

Ft. Osage
 Northeast

Section B

Valarie Copridge Van Horn
 Theresa Darby Wm. Chrisman
 Valerie Dike Ft. Osage
 Nikki Elkins Northeast
 John Gribble Ft. Osage
 Paul Grutter Truman
 Allen Halsey Truman
 Jeremy Hammond Truman
 SeHan Kim Van Horn
 Brian Leakey Wm. Chrisman
 Angela Matheson Northeast
 Stephanie McGuire Wm. Chrisman
 Maria L. Mendez Northeast
 Stephen Rice Ft. Osage
 Mike Steadman Ft. Osage
 Kendra VanTuyt Wm. Chrisman
 Cash Young Truman

Section C

(Calculus I and II)

Brad Allen Wm. Chrisman
 Jason Anderson Wm. Chrisman
 Holly Buxter Van Horn
 Jared Coleman Truman
 Mark Crawford Northeast
 Christina Ketchum Truman
 Kathy Minton Ft. Osage
 Erik Pratt Wm. Chrisman
 Matt Roberds Truman
 Amie Sanchez Wm. Chrisman
 Jennifer Spungen Truman
 Nhat-Thuy Tran Northeast
 Mao Vath Northeast
 Don Wolfgeher Truman

THE 1990-91 CLASS (TO DATE)

Section A

Paige Anderson Wm. Chrisman
 Jill Blake Truman
 Ben Brewster Truman
 Maitram Bui Northeast
 Kimberly D. Calahan Truman
 Wesley Clarkson Truman
 Scott Goodman Ft. Osage
 Anthony Hall Van Horn
 Sheri Harrison Wm. Chrisman
 Jeff Hoskins Truman
 Angela Lord Northeast
 Eric Loving Wm. Chrisman
 Jenny Myers Wm. Chrisman
 Julie Park Truman
 John Peery Wm. Chrisman
 Shawna Russell Ft. Osage

Section D

Shalom Barber Wm. Chrisman
 Christopher Bird Truman
 Janette Brauningner Wm. Chrisman
 Trina L. Coleman Northeast
 Maggie DonCarlos Ft. Osage
 Marisela Guillen Northeast
 John Helms Truman
 Tom Martin Wm. Chrisman
 Jacquelynne Morris Van Horn
 Stacey Mountjoy Ft. Osage
 Cuong Nguyen Northeast
 Mary Noah Wm. Chrisman
 Raymond Rast Wm. Chrisman

Section D (Cont.)

| | |
|------------------|--------------|
| Todd Reimer | Ft. Osage |
| Charles R. Smith | Van Horn |
| Troy Stogsdill | Ft. Osage |
| Jason Windes | Wm. Chrisman |

These are the total of 66 students (as of this newsletter) who will be enrolled. As usual there will be additions and deletions through September.

THE 1990-91 STAFF

Our staff once again includes those high school teacher veterans of the past six years:

In Physics:

Larry Harding from Fort Osage,
Calvin Nelson from Northeast,

and, in Calculus:

Sheri Adams from Truman,
Joe Kaifes from Van Horn,
& Al Morse from Wm. Chrisman,

while our University staff is listed in the heading of this newsletter. We should also mention our half-time secretary and assistant Doris Kirst.

UPCOMING ENRICHMENTS

One of the special features of the Institute is its biweekly enrichment series, in which on alternate Wednesdays either professionals in the sciences, engineering, mathematics, etc., speak to our MPI students, or, we have a field trip to such places as the nuclear reactor in Columbia, the GM Fairfax plant, or Worlds of Fun to do some 'hands on' physics.

The October 1 newsletter will report on those speakers scheduled for October and beyond. But as part of our first three days of

orientation, Jan Longhorn of UMKC, will speak on Fri. Sept. 7 about college admissions in general, and the importance of thinking about applications EARLY. (This is not intended to be a recruitment for UMKC, but a general discussion to help sensitize our students to the importance for colleges of deadlines.)

During the first two weeks of classes at the MPI we will also spend two days discussing four topics which we have come to believe are vital study and college survival skills that are too often not directly addressed. Specifically, these are: NOTE-TAKING, TEST-TAKING, READING A TEXTBOOK, and lastly, and perhaps most importantly, TIME MANAGEMENT. These sessions will be jointly presented by David Arendale from UMKC's Academic Support Services, and the MPI mathematics coordinator.

TO THE PARENTS OF THE 1990-91
CLASS AT THE INSTITUTE

[Reprinted in part from the August 1, 1987 newsletter.]

This newsletter is written for YOUR information, and there will be one sent to you every two months during this year while your son or daughter is at the Institute.

We firmly believe that without your support and concern at home students cannot succeed in such a rigorous program as the MPI. Our classes are NOT high school classes - they are special college classes, and require both study skills and a commitment that students still in high school, however talented, have not experienced before. In both of these areas YOU as parents can be of enormous help.

One of the first facts we have learned to face in the last six years
(Continued after the Calendar)

Calendar 1990 - 1991

| | |
|---|-------------------------------------|
| Institute Begins | September 5, 1990 |
| Mid-1st Quarter Progress Reports Sent | October 4, 1990 |
| 1st Quarter Grade Reports Sent | November 2, 1990 |
| MPI Open House for Parents/Teachers/etc. | November 4, 1990 |
| Thanksgiving Holiday | November 22-23, 1990 |
| Mid-2nd Quarter Progress Reports Sent | December 6, 1990 |
| Institute Christmas Party | December 14, 1990 |
| Christmas Holiday | December 15, 1990 - January 1, 1991 |
| Institute Classes Resume | January 2, 1991 |
| College Credit WD Deadline (Math C Only) | January 11, 1991 |
| Final Exam - Calculus I - (Math C Only) | January 15, 1991 |
| 2nd Quarter/1st Semester Grade Reports Sent | January 17, 1991 |
| Deadline for Transfer from Math C to Math A, B, D | January 18, 1991 |
| Martin Luther King Holiday | January 21, 1991 |
| Presidents' Day Holiday | February 18, 1991 |
| Mid-3rd Quarter Progress Reports Sent | February 22, 1991 |
| 3rd Quarter Grade Reports Sent | March 22, 1991 |
| Spring Break | March 25 - March 29, 1991 |
| Institute Classes Resume | April 1, 1991 |
| High School Credit WD Deadline (A, B, C, D) | |
| College Credit WD Deadline (A, B, C, D) | April 1, 1991 |
| Mid-4th Quarter Progress Reports Sent | April 19, 1991 |
| Final Exams - Calculus I (A, B, D) and Calculus II (Math C Only) | May 14, 1991 |
| Final Exam - Physics (A, B, C, D) | May 15, 1991 |
| Institute Picnic Breakfast (McCoy Park) | May 16, 1991 |
| Last Day of Institute Classes | May 17, 1991 |
| Institute Awards Presentation | May 17, 1991 |
| 4th Quarter/2nd Semester Grade Reports Sent | May 17, 1991 |

is that many bright students never learn to study efficiently; they have often gotten along very well with a 'wait and cram' attitude, giving textbooks only an occasional cursory look in time for testing, and relying on their innate ability to absorb information and skills in the classroom. However, in coming to the Institute these same students always find themselves at first, and suddenly, falling behind.

In general, in college classes MORE MATERIAL is covered, and MORE SKILL with concepts is required, i.e., THINKING is expected regularly. This comes as a shock to many talented students. One of the Institute's goals is to expose students to this shock, and help them overcome it by learning effective study skills in actual practice. But YOU as parents can help this transition enormously, by suggesting that your children actually spend the minimum of one hour per subject, per night of study that we here at the MPI urge. They must come to realize that longer study times reflect the new rigor of the COURSES, not their lack of talent. This is a point of view that many students find hard to accept at first. Your encouragement can help them over this hump. Encourage them to seek the help of all the teachers involved in the program, and to put aside the false idea that only remedial students need to TALK about mathematics and physics. The fact is that true understanding comes only from learning to discuss and explain a subject, and this is ESPECIALLY SO in physics and mathematics.

Finally, we urge you to call us if you ever have a question, and we hope that you will find time to visit the Institute during our annual OPEN HOUSE on Sunday afternoon, November 4, 1990. (more about this in the October newsletter.)

ABOUT PAST STUDENTS

SARAH LITTLEWOOD [85-86]

Last May, Sarah Littlewood, our number 2 student of Year 2 at the MPI, graduated from Wm. Jewell College with a double major in mathematics and physics. Happily she was then selected to receive a National Physical Science Consortium fellowship, to become a graduate fellow at Washington Univ. in St. Louis. Her employer-sponsor is the National Security Agency. The fellowship is a six year award with a stipend of \$10,000 each of the first two years, \$12,500 each of the second two, and \$15,000 each of the last two, as well as two summers of employment for the National Security Agency.

We congratulate Sarah, and are proud to have had her as one of our students.

C. J. KROON [85-86]

"To All Who Remember me:

As you are now aware, I live in Australia. My return to South Africa (C. J. was a foreign exchange student from South Africa.) was brief and I then went on to do a tour of Europe, seeing many friends en-route.

Unfortunately, I didn't get to see Izzet in Turkey (Izzet [85-86] was a foreign exchange student from Turkey). However, we have maintained contact since leaving U.S.A. He is studying at college and probably wishing he was back at UMKC.

I am well and started in Australia with a few ups and downs. I couldn't find a job (must be my personality or something). Anyway, I advertised and became a maths/physics tutor to earn some money. The poor students. After a while, this slowed down and I started selling insurance and have formed a business with this operation being the core.

Things are well, I wanted to keep in touch. I appreciate your efforts and dedication to the institute. Thanks for all I have learnt and keep up the good work."

A SOLUTION TO
MATHEMATICS CHALLENGE #13

Recall the problem statement:

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

SOLUTION:

We first divide, with the overall aim of reducing our expression to simple (partial) fractions:

$$\frac{n^4 + n^2}{2n + 1} = \frac{n^2(n^2 + 1)}{2n + 1} = \frac{n^2}{4} \cdot \frac{4n^2 + 4}{2n + 1}$$
$$= \left(\frac{n}{2}\right)^2 \cdot \left(2n - 1 + \frac{5}{2n + 1}\right)$$

We will therefore have EXACT division only if both 2 divides n and $2n + 1$ divides 5. The latter condition forces $2n + 1 = 1, -1, 5, \text{ or } -5$, meaning $n = 0, -1, 2, \text{ or } -3$. But the former condition forces n to be even, while the statement of the problem requires that n be positive. Hence, the only positive integral solution is $n = 2$.

[From: Mathematical Quickies, by Charles W. Trigg.]

A SOLUTION TO
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?

SOLUTION:

As the hot water heats the faucet valve, the valve's metal expands and shuts off the water flow.

MATHEMATICS CHALLENGE #14

Find three consecutive integers such that when all six possible fractions are formed from these integers, the sum will also be an integer. Prove that your answer is unique.

PHYSICS CHALLENGE #5

To make a hard line drive in baseball you must get the bat into the proper position for the collision with the thrown ball. How much error can you stand, both in the vertical direction and in time, and still be able to get the hit? For example, would it be all right if your timing is off by some small amount such as 0.01 second?

MPI T-SHIRTS

Beginning in about October, we will once again be selling bright blue MPI T-shirts and sweatshirts to our students. These shirts have a classy 3D graph on the back and a clever student-designed logo on the left front.

Editor/Writer: Richard Delaware

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'.
