

MPI

The Mathematics and Physics Institute NEWSLETTER

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OVER THE HUMP

We extend congratulations to our current TOP ELEVEN students, which we have determined by averaging their college Calculus and Physics grades for the first semester. (There are 11 this time since two students tied for 10th place.) They are listed below alphabetically by school:

Anthony Aguilera	(Fort Osage)
Jon Fox	(Fort Osage)
Stephanie Young	(Fort Osage)
Seth McMenemy	(Truman)
Candi Smith	(Van Horn)
Kevin Crosby	(Wm. Chrisman)
Jay Eifler	(Wm. Chrisman)
Jim Hitchcock	(Wm. Chrisman)
Dean Keeling	(Wm. Chrisman)
Todd Myers	(Wm. Chrisman)
Tammy Phelps	(Wm. Chrisman)

(Note: Stephanie Young is taking only Physics.)

a team in the annual TEAMS competition (Tests of Engineering Aptitude, Mathematics and Science) to be held on the UMKC Truman Campus on Friday Feb. 17. We are entered in the category for schools with either a population of 1000 or more, or 'selective' by some academic criteria.

The 8 members of our first team (listed alphabetically), and the tests they will take (Comp.Fund.= Computer Fundamentals) are:

Anthony Aguilera	- Math/Chem.
Jeff Coleman	- Math/Comp.Fund.
Jon Fox	- Phys./Chem.
Dean Keeling	- Math/Biology
Andrea Linville	- English/Biology
Seth McMenemy	- Phys./Chem.
Jon Morgan	- Phys/Comp.Fund.
Tammy Phelps	- Math/English

We wish them luck and insight on Feb. 17.

MATHEMATICS AND SCIENCE VIDEOTAPES -- UPDATE

Between Jan. 3 and Jan.23, 1989 we have received videotape requests from 141 different high schools for a total of 873 videotape copies. We have 15 special enrichment presentations in mathematics and science on tape. These were made at the MPI and taped so they could be shared with other high school students across Missouri.

OUR FINAL 'TEAMS' TEAM PREPARES

As mentioned in the last newsletter, for the first time this year the MPI will be entering

!! CURRENT MPI PARENTS !!

Did You Receive Your
Oct. 1, 1988, and Dec. 1, 1988
MPI NEWSLETTERS?

We gave them to your children to hand-deliver to you. We have extra copies if you didn't receive them.

ENRICHMENTS

Our annual Panel Discussion went well on Jan. 4, with a student panel consisting of former MPI students Jim Cady (87-88), Reese Isbell (87-88), Charley Pine (87-88), Kenny Sessa (86-87), and

Vanessa White (87-88). About 16 other former students also appeared, to share their college experiences with this year's class.

Readiness Test in late April or early May.

UPCOMING ENRICHMENTS:

On Feb. 1, Bill Fields will return with his informative talk on Radiation Properties.

Feb. 15 will see a newcomer, Kevin Kerschen from Black and Veatch, consulting engineers, who will discuss new developments in solar power, especially Photovoltaics.

Dr. Richard Friedlander of UMSL will return on Mar. 1 for another of his enlightening mathematics lectures on THE HARMONIC SERIES.

Following him, on Mar. 15, Dr. Larry Campbell of the School of the Ozarks will once more present his talk: INTERESTING AND WEIRD MATHEMATICIANS.

Lastly, on Mar. 29 we hope to take a field trip to the local GM plant in Fairfax, a highly automated and very modern automobile manufacturing plant.

MPI RECRUITMENT FOR NEXT YEAR

This year, instead of touring to each of the 6 participating high schools, we have decided to experiment with offering our recruitment presentation only once at the MPI on a convenient date (probably Feb. 14), and have all interested students from the several schools visit us here. We hope that this will allow us to give a better 'show' as well as take our visitors on a tour of our classrooms and laboratory.

We will, however, still visit each of the schools individually to administer the Calculus

THE MPI TEACHING LOG

This month, since in Calculus we have finally completed most of the material on the elementary differential calculus, we will be taking the time for two brief interludes. The first will consist of presenting a 'real-life' civil engineering problem to our students in the form of a TEAMS problem (Teaching Experiential and Applied Mathematics; not connected with the TEAMS tests mentioned elsewhere in this newsletter.) The question is one of highway slope design and is presented first by a civil engineer on videotape, and then by a printed workbook containing the particular problems and questions. Following their solution of these problems, using the calculus they know, the students will see a second videotape in which the civil engineer discusses his solutions. This project was well-received last year and we hope it will be once again.

The second interlude, before we leap into the integral calculus, will be a week-long discussion of mathematical induction, including about 40 induction problems of various types to practice on.

Both of these interludes give us all a break from the textbook, and perhaps can generate a little enthusiasm for the second semester.

STUDENT QUOTES AGAIN!

" The MPI has been quite a challenge for me. It has been beneficial by allowing me to get a feel for college-level Calculus and Physics. As much as I like the

challenge, there are many times that I want to scream and run away from all the studying involved to make a good grade. However, I do believe that this experience is preparing me for the studying I will do in college. MPI is real life."

Candi Smith
Van Horn High School
Kansas City, MO. District

" When I signed up for the MPI I knew it was going to be a challenge, but I saw it as an opportunity to help prepare myself for college. The courses are quite unlike the average high school classes, and no matter how intelligent an individual is, if he doesn't pay attention he will fall behind. It's an experience that I am certain will help me throughout my life."

Dean Keeling
Wm. Chrisman High School
Independence District

" I feel that the Institute has given me a necessary break from high school life. I think that this is somewhat preparing me for college life and I'm glad that I had a chance to do this and get a head start in college."

Seth McMenemy
Truman High School
Independence District

" The MPI provides the extra challenge that I need to keep school interesting. it has given me a taste of what a college course demands and how I can apply myself and be successful."

Tammy Phelps
Wm. Chrisman High School
Independence District

A FAREWELL LETTER

"To Richard (D.), and the MPI:

With this short letter I would like, to you and the rest of the MPI, to tell thank you very much for giving me the chance to be one of your students.

I decided not to follow in for the second semester for several reasons. Probably the most important, that I see I'm not 'progressing' all I can; I mean: OK, I kept passing (even if just-just) but I did not see I have learned all we were taught, part of it because of the language. (Also) I do not have all the time I would like to spend 'playing with numbers', doing calculus homework. Anyway, since I felt often oppressed because I can't do what I would, I decided to drop it, but... thanks again for the good, positive experience I have now after being around you: different way of teaching from American High Schools, enrichments, friendly teachers and students. Without coming in I wouldn't have learned and met all this.

So ESKERRIK-ASKO, as I would say in Basque (thank you very much) again, and sorry because I can't be the kind of student I am sure you like at the Institute. Best wishes to all of you, and very good luck in the pursuit and future of the MPI and UMKC. I am glad I met you,

Sincerely, Ainhitze Bravo

PS: Sorry if any English mistake."

(Ainhitze was our Basque student in the foreign exchange program at Fort Osage High School. She was only enrolled in Calculus, and her primary teacher at the MPI was Sheri Adams. Ainhitze left us at semester.)

A SOLUTION TO
MATHEMATICS CHALLENGE #8

Prove the inequality:

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

SOLUTION:

Since the product, x , on the left seems unwieldy, we'll see if we can modify it to discover a product easier to work with. Toward this end, notice that:

$$\frac{1}{2} < \frac{2}{3}, \quad \frac{3}{4} < \frac{4}{5},$$

$$\frac{5}{6} < \frac{6}{7}, \quad \dots, \quad \frac{99}{100} < \frac{100}{101}$$

Now let

$$y = \frac{2}{3} \cdot \frac{4}{5} \cdot \frac{6}{7} \cdot \dots \cdot \frac{100}{101}$$

So, each factor in the product x is less than the corresponding factor in the product y , meaning: $x < y$. Multiplying both sides of this inequality by x then gives: $x^2 < xy$. But, by rearranging the factors in xy , we see that

$$xy = \left(\frac{1}{\cancel{2}} \cdot \frac{\cancel{2}}{\cancel{3}} \right) \cdot \dots \cdot \left(\frac{\cancel{99}}{\cancel{100}} \cdot \frac{\cancel{100}}{101} \right),$$

$$= \frac{1}{101}, \text{ so } x^2 < \frac{1}{101} < \frac{1}{100}$$

Then taking the square root yields

$$x < \frac{1}{10}, \text{ as desired.}$$

MATHEMATICS CHALLENGE #9

Every person on earth has shaken a certain number of hands. PROVE that the number of persons who have shaken an ODD number of hands is EVEN.

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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) 276-1272. Please address all correspondence concerning this newsletter to 'MPI Newsletter'.