



Mathematics Coordinator: Richard Delaware
Physics Coordinator: Jennifer Discenna

August 1, 1998

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YEAR 15 -- A NEW ERA?

In several ways this 15th year is a new beginning for the MPI: we have new leadership, a new Physics Coordinator, and a new Mathematics teacher, and a new graphing calculator. But in most ways, the MPI will continue as it has for the past 14 years, to provide a firm foundation in Calculus and Physics, and prepare for college work any qualified student joining the MPI family who is willing to study with diligence. Our proudest moments are when former MPI students write to tell us how well we prepared them for the work ahead, and that we substantially contributed to their success. The future is the business of education, and our future always resides in our current students. Welcome to the MPI.

MPI STUDENT ORIENTATION SEPT. 2 - 4, 1998

Each year the first three days at the MPI 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 class work.

In particular, on the first day, Sept. 2, 1998, we'll provide each student with a packet of information and have each of them fill out a personal data form.

If you have any questions, call our MPI secretary Doris, Mon. - Thurs., 8 am - 1 pm, 235-1272. We look forward to seeing our 15th class on **Wed. Sept. 2 at 7 am in Rm 207!**

STUDENTS PLEASE BRING,
ON SEPT. 2, 7 am, TO ROOM 207

- Your Social Security Number.
- \$10.00 to rent a calculator.
- Your daily schedule of high school classes.
- Your schedule of extra-curricular activities.
- Your counselor's name.
- Ideas for Enrichment Speaker or topics.

OUR NEW PHYSICS COORDINATOR: FROM KALAMAZOO TO KANSAS CITY

"My interest in Physics began when I was an undergraduate at Kalamazoo College in Kalamazoo, Michigan. While at "K" College I worked for the Naval Research Laboratory in Washington, DC for three semesters. I worked for a radio astronomer analyzing data from the radio telescopes (like in the movie "Contact"). We didn't contact any aliens, but I did get a chance to work with a real physicist.

After that I went to Michigan State University for graduate school. While I was there two important discoveries took place. The first was that I got involved with Science Theatre (ST) which is an outreach activity begun by the graduate students in the physics department. While associated with ST, I got to write columns for the local newspaper answering science questions, present science "shows" to school groups and statewide audiences, plan an international conference, and write a

book of science demonstrations. Belonging to ST made me realize that although I loved physics, I loved to teach it best. So, I left MSU with a MS and enrolled in the Phd program in Science Education at Western Michigan University.

At WMU, I worked on understanding what physics is about and how people learn. This involved a combination of studies in education, philosophy, psychology, and, of course, physics. For my dissertation I won the Graduate College's Dissertation Fellowship, as well as the University's Creative Scholar Award. I've presented my work at Conferences of the Cognitive Science Society, National Association of Research in Science Teaching, American Educational Researchers Association, and the American Association of Physics Teachers.

The second important thing that happened at MSU was that I met my now fiance, Steve Snyder. Steve finished his PhD in Physics at MSU and is now Director of Science at the Science City at Union Station Project. So, I am happy to be in Kansas City doing what I love - teaching physics - and also being in the same city after many years with Steve."

Jennifer Discenna

MPI E-MAIL ADDRESS:

rdelaware@cctr.umkc.edu

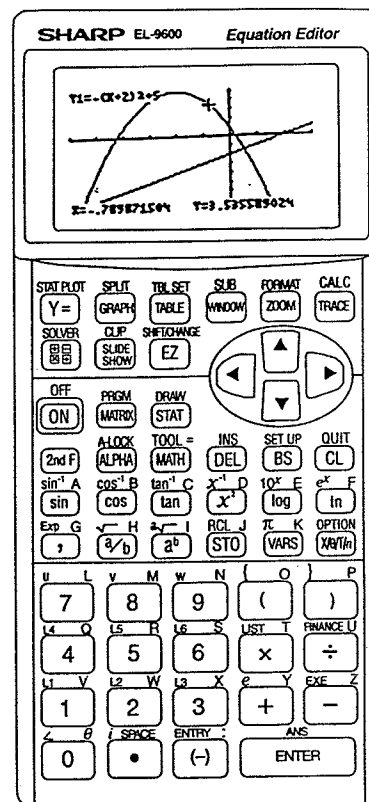
A list of known MPI Alumni e-mail addresses is available on request.

MPI GRAPHICS CALCULATORS

The MPI requires ALL students to have and use a graphics calculator in both physics and calculus. For our purposes we have selected the new SHARP EL-9600. Although the SHARP is not the most powerful such graphics calculator on the market, it is ideally suited to the MPI, and its selection of students. One unique feature, even in older models, is the ability to enter fractions and exponentials exactly as you would

write them on paper. Some new features, beyond those in the former SHARP 9300C (now out of production) are:

- Pen-touch screen entry option [A plastic stylus is included.]
- TABLE feature
- Up to 10 x-y functions for graphing (rather than 4)
- Unique Rapid Graph, Rapid Window, and Rapid Zoom features
- Connects to a TI CBL (Calculator Based Lab)
- Sequence graphing
- Split Screen option
- More pixels for a finer screen resolution
- Slide show feature



All MPI students are required, to rent a SHARP EL-9600 from us, paying a \$10.00 one-time, non-refundable fee for the entire academic year, with an option to buy the calculator outright at any time [the full price, after the rental fee is deducted, is \$60.00], OR, to provide themselves with an equal or better graphics calculator from among only the following models: TI-86 (TI-85), HP 38G, HP 48G (HP48GX). [Information, including cost, on all these graphics calculators can be

gotten from the MPI Mathematics Coordinator by calling 235-1290.] Please note that MPI support and an MPI calculator manual will only be provided for the one calculator we rent.

The MPI rented calculators will initially be loaded with a set of AAA batteries, but as these fail over the course of the year, student-renters are entirely responsible for buying and replacing them. (Our experience has been that at most one or two replacements are needed over the year.)

TO ALL MPI ALUMNI:

HAVE YOU GRADUATED FROM COLLEGE?

IF SO:
PLEASE CONSIDER BEING AN
- ENRICHMENT SPEAKER -

CALL (816) 235-1272
or E-MAIL
rdelaware@cctr.umkc.edu

MPI Alumni who have spoken:

Brent Harding	(84-85)
Pam Deters/Stephen Koop	(84-85)
Seth McMenemy	(88-89)
Mitch Dobson	(89-90)
Rachel Allen	(92-93)

1998 MPI AWARDS PRESENTATION AND TOP 10 MPI STUDENTS OF 1997-98

Our final awards presentation was held on May 14, 1998, during which we were pleased to present many of our 1997-98 students with the following variety of awards (see list). Also present were 18 administrators, counselors, board of education members, and the superintendents of the Fort Osage and Independence School Districts.

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

CALCULUS I

(Name)	(School)
José Alcocer	Van Horn
Matt Ashbaugh	Wm. Chrisman
Joseph Chapman	Truman
Tim Gengler	Ft. Osage
Jenny Green	Truman
Zaid Hayyeh	Wm. Chrisman
Courtney Jones	Truman
Adam Lipps	Wm. Chrisman
Donnie Miller	Wm. Chrisman
Gretchen Nguyen	Northeast
Tommy Prichard	Wm. Chrisman
Richaela Riley	Paseo
Alicia Siy	Wm. Chrisman
ViSach Son	Northeast
Brent Thompson	Ft. Osage
Amy Williams	Truman
Matt Woolf	Truman

CALCULUS I and II

Jeff Weston	Wm. Chrisman
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PHYSICS

José Alcocer	Van Horn
Joseph Chapman	Truman
Tim Gengler	Ft. Osage
Courtney Jones	Truman
Adam Lipps	Wm. Chrisman
Donnie Miller	Wm. Chrisman
Gretchen Nguyen	Northeast
Eric Noland	Wm. Chrisman
Alicia Siy	Wm. Chrisman
ViSach Son	Northeast
Brent Thompson	Ft. Osage
Jeff Weston	Wm. Chrisman
Amy Williams	Truman

We also honored the **TOP TEN** students (ranked according to the mean of their full-year college calculus and physics grades) by giving them a one year subscription to Scientific American magazine, and a copy of "What's Happening in the Mathematical Sciences":

TOP 10 MPI STUDENTS 1997-98

1) Courtney Jones	Truman
2) Jeff Weston	Wm. Chrisman
3) Brent Thompson	Ft. Osage
4) Gretchen Nguyen	Northeast
5) Amy Williams	Truman
6) José Alcocer	Van Horn
7) Adam Lipps	Wm. Chrisman
8) ViSach Son	Northeast
9) Tim Gengler	Ft. Osage
10) Donnie Miller	Truman

Finally, we list 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 Chancellors Award Winners:

Ken Chretien (MPI)	Ft. Osage
Zaid Hayyeh	Wm. Chrisman
Daphne King	Van Horn
Tabitha Kremer	Truman
Sherise Massey (MPI)	Central
Richaella Riley (MPI)	Paseo
ViSach Son (MPI)	Northeast

UM Curators Award Winners:

Alicia Siy	Wm. Chrisman
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**ADVICE TO STUDENTS OF YEAR 15
FROM THE STUDENTS OF YEAR 14**

At the end of this last year, in May, we decided once again to have our students write however much they wanted in answer to the question:

"What ADVICE would you give to incoming students about study, attitude, or any other aspect of surviving the MPI in 1998-99?"

We were pleased at how seriously and with what maturity they wrote, and so each incoming student will receive a complete set of these words of advice from the students of Year 14. Here are some excerpts from that document:

"Whatever you do, don't sleep during lectures. Try to do your homework as soon as possible, otherwise, you are going to fall behind pretty quickly. Work as many problems as you can and ask as many questions as possible."

José Alcocer
Van Horn High School

"When you get 'Suggested Problems' sheets, be sure to use them for more than notes for other classes. Sleep a lot, drink a lot of caffeine, and DON'T SLEEP IN! You never know what you may be missing (unless you checked the schedule beforehand)."

Kevin Butler
Ft. Osage High School

"If you want to make the grade at M π , you need to study and do your homework. Those are the keys of success here. You don't have to study a whole lot, just do the homework and go over everything so that you understand all concepts and equations, and have all equations memorized.

If you don't want to make the grade, then go back to your school, and just take one of the simpleton math classes there.

Believe me, there is nothing like M π you can experience anywhere else. This is looking at it in every way from the knowledge you gain to the skills you learn. The fruits you will pick are very plentiful and don't take much or even close to put in what you get out.

You will be entered into an atmosphere of students who are intelligent and easier to get along with than what you're used to, that alone will make it easier and more enjoyable."

Zaid Hayyeh
Wm. Chrisman High School

"Don't procrastinate, don't wait until the last minute to do the work that has been assigned at the beginning of the week. Don't approach a test with the attitude that you will do well if you haven't studied, but programmed all the equations into your calculator. Don't forget to have fun, this will be your last year of high school, hopefully."

Wilma Hines
Lincoln High School

"The first month of MPI is hard, but if you can survive the algebra drills you'll be okay. If you've never had to study for math tests before, you'll learn quickly. Do lots of calculus homework - it's not required, but it's the best way to prepare for tests. Good luck! If you work hard, MPI will be a very rewarding experience."

Courtney Jones
Truman High School

"One of the major things you must do is the "suggested" homework problems. If you do these after each section you should be alright. Don't think you can come in here and not study and do no homework and get an "A". That is what I thought, because that is what math was to me, until I got here. Overall, it's a fun place and the teachers are nice. Oh, and be sure to set your alarm early, cuz I was always late."

Ken Chretien
Ft. Osage High School

"To all future MPI students, you have to come in ready to work hard with a grin-and-bear-it attitude. You might not get A's on everything, or most things like myself, but I kept going. Even if you know the work, never never, slack or be absent. These are the two major downfalls. Even if you are one of those people with a little natural human ability, you will have to work hard at it. Another thing, is remember, even if everyone around you acts like they get the thing you just went over, chances are that's not true. Even if it is, don't be afraid to ask, rather you may look dumb in class than on a test!"

Lillian Jones
Lincoln High School

"You're in for a real learning experience. If you're used to passing classes without working hard or studying, those days are OVER!!! Don't be afraid to put forth a serious effort and you'll see positive results. Things are not as difficult as they seem. Stay focused and you'll be able to accomplish anything. Don't give up!! Good Luck, you may need it."

Daphne King
Van Horn High School

"Coming to the MPI was one of the greatest and hardest accomplishments I have ever done. My advice to the next year is not to procrastinate, get started on things early, and don't be too overwhelmed. It will be rough for a few weeks, but if you stay with it and don't get too

far behind, things will work out for the best. When I started at the MPI, I didn't really know what to expect. I am leaving with more knowledge than I ever thought I could learn. If you find you are having troubles, talk with your classmates or the teachers, who knows, maybe they are having the same problems. The people you are with are your lifeboat. They will help you if you ask. Don't be afraid to ask questions. The only stupid question is the question that is not asked. My last advice for next year's group is this. You are all seniors, the year will fly by, every once in a while you must look back and reflect on the past. Whatever you do, have fun. Don't get down, and stay on top of the work."

Jason Kleyh
Wm. Chrisman High School

"Form study groups early. Study all the time. Ask questions, the only dumb question is the one you don't ask. Work hard all year, hang in there, it gets easier as you learn how to study for math. And in the words of Al Morse (calculus teacher) when you come across a hard calculus problem, spank it, spank it hard"

Tabitha Kremer
Truman High School

"I would suggest that you study every night. Also, do homework every night. If possible, do work (or just read) ahead than what's assigned. Take as many notes as possible (you will need to use your textbooks as well). Even with all their advice, the classes still might be tough, but if you really, really want the grade, you'll stick it out. Last piece of advice: you will have to work in groups. Working alone is not a good idea. I wish all incoming students good luck."

Sherise Massey
Central High School

"Sometimes some things only happen once in a lifetime. If ever there was anything which offered a worthy challenge and rewarded what you earned, it is MPI, an eager student's dream-come-true. Sure, the professors are beyond words, always

offering a sincere, helping hand.

Like the steps which lead to MPI, the path to travel, at first, seems somewhat long and difficult. Then again, it may not be the material itself. Moreover, the true test of MPI is in yourself, defined by your perseverance. Success comes to those who make excellence their goal, and act to achieve their dreams. If you value this opportunity, and put forth an honest effort, the true rewards of MPI will last a lifetime."

Gretchen Nguyen
Northeast High School

"Pay attention, take notes, do your homework and the amount of time that you'll need to spend studying will be small or none. Don't miss any lectures, because if you do, it's really hard to catch back up and understand the new stuff. If you do bad in the first couple of weeks, don't drop, stick with it. I started out bad, but finished up well."

Tim Gengler
Ft. Osage High School

"When they tell you that MPI is more gifted students, they are right! This being the case, they give you many gifts. A few examples are pages long Calculus and Physics problems, week-long assignments, and so many other things..."

Most MPI students do not study before entering the MPI. They don't have to. I never did. I did more out-of-class work for MPI than all of my out-of-class work ever..., combined!

Just remember you are the most intelligent of all of the seniors in the Kansas City area, all in one place! You deserve a challenge."

Eric Noland
Wm. Chrisman High School

"Morning, I think, is the word they use to describe that awful time of day that calls you from your comfortable sleep. There is whimpering and snarling and scowling faces to greet you in the morning as

you're on your way to the MPI, but beyond that ugly layer that surrounds your early journey, you see the sun begin to rise before you, and think about why you decided to do this in the first place. Maybe to get ahead in your education, maybe to test yourself. Maybe you wanted to impress your friends, family, teachers, strangers, maybe to impress yourself. You may decide this is too hard, and it can be very hard. Maybe you will get frustrated and decide it isn't worth the time, the loss of sleep, the humiliation. Where did that come from? I don't think there is any reason to give this up, there is time, there is a way to get to bed in time, there is no humiliation. No one out there will tell you you're a failure if only you try and try again. Show your strength, grin and bear it. Don't be afraid of something that fights back, it only gets harder if you decide to push against that immovable wall. Why not step back and look for the door, a window, a crack, a way to get inside what you don't understand, make yourself at home and try, with a clear mind, ready to soak up all you can. This place can bleed you to death only if you let it, and maybe in the beginning you'll think that may be a little extreme, but watch out, because it can creep up from behind and attack you at the last minute.

In short, study (I know it sounds generic, but it's true), give yourself time to read the information, soak it up. Take time to ask questions (you'll have plenty), take time to listen to the answers. Get used to the morning, it may not be your friend, but make it tolerable because it doesn't change. Remember, you chose to come here for a reason, whatever it may be, and if your vision gets blurred by the weight of the work, or the time in the morning, buy some eye drops and some coffee, wake up, open your eyes and remember that you're here because you can be here."

Richaela Riley
Paseo High School

"Just to let you know: **THE (PHYSICS) STUDY GUIDE IS YOUR FRIEND!!!**"

Alicia Siy
Wm. Chrisman High School

"Coming to MPI is not to have fun, because you don't have that much time to do so, but to dedicate in study for your own knowledge and get a feeling of the expectations in college. So later when you graduate from HS, you could adapt your learning skills toward college easier. No courses or professors in our high school has the ability to give you the knowledge you need like MPI. It's a real college, you can only learn if you work hard and do good on the exams, unlike HS that all you have to do is be quiet and do work. More time and more concentration is needed in order to succeed in MPI.

PLEASE!! Don't go to work more than 30 hrs/week. It is my experience that not only MPI and my other HS courses put pressure on me but also my job, because I work more than 45 hrs every week. I have experienced how difficult it is to do the homework late at night from 10:00 pm to 1:00 am. MPI is not an easy course, you have to spend time to read the textbook and understand very clearly throughout the chapters in order to do good on the exams. Too much work is what put me to sleep in almost every lecture. It's hard to open my eyes when I have only 5 hours of sleep every night when I was so tired from my job. You have to change your attitude about education when you come to MPI. Give yourself the determination and the ambitions of learning and competing with other students from other high schools before you come to MPI, and be proud to give yourself another step toward your dream destination/goal."

ViSach Son
Northeast High School

"At first MPI is going to seem difficult and trying; but if you stick with it and work hard, MPI will get easier and will also pay off. I remember when I first started going to MPI, I thought that I'd never get through the course. Starting school at 7:00 in the morning, walking up ice-covered steps in the winter, struggling through Mr. Delaware's tests; I thought the year would never end. But I'm glad I stuck with it. Not only did I learn a lot about calculus and physics, but I also earned 8 hours of free college credit. I know you can do the same

if you just give it your best. Good luck!"

Brent Thompson
Ft. Osage High School

"There is only one idea that is more important than any other, and it should be repeated over and over again..."

STUDY - STUDY - STUDY - STUDY!!"

Cary Tompkins IV
Wm. Chrisman High School

THE 1998-99 CLASS (TO DATE)

Section A (21)

Joshua Albin	Truman
Michelle Bailey	Truman
Anthony Brown	Central
Sherri Campbell	Van Horn
Lenora Coffee	Van Horn
Josh Hitch	Wm. Chrisman
Jennifer Jecker	Truman
Jerome Jennings	Wm. Chrisman
Ryan Kliethermes	Truman
Susanne Leslie	Truman
Adison Loving	Wm. Chrisman
Catherine Lynas	Truman
Lara McMillin	Ft. Osage
Sambath Ngek	Northeast
Trinh Phan	Northeast
Joe Pollard	Truman
Monica Rayford	Van Horn
Amanda Rodriguez	Paseo
Latisha Thomas	Northeast
Laura Van Fleet	Ft. Osage
Anna Webb	Wm. Chrisman

Section B (21)

Kasaundra Breedlove	Van Horn
Megan Carlson	Truman
Danica Chronister	Van Horn
Joshua Cochran	Ft. Osage
Dana Curran	Northeast
Jared Daniel	Wm. Chrisman
Tennille Grant	Northeast
LaKeeia Hawkins	Van Horn
Phuong Le	Van Horn
Brian McMillan	Wm. Chrisman
Julia Nieweg	Truman
Rebecca Phillips	Van Horn
Laura Pircher	Truman
Lori Prier	Truman
Jonathon Reynolds	Ft. Osage
Derrick Rohr	Ft. Osage
Kyla Trebisovski	Northeast
Ben Walker	Truman
Angelina Walls	Ft. Osage
Jordan Webb	Wm. Chrisman
Ryan Wilson	Truman

Section C (9)

Katherine Allen	Truman
Blake Gwinn	Wm. Chrisman
James Henry-Rhoads	Wm. Chrisman
Khushal Latifzai	Wm. Chrisman
Brad Martin	Truman
Johnny Scott	Wm. Chrisman
Erika VanTuyl	Ft. Osage
Mychel Varner	Truman
Michael Watts	Truman

Section D (21)

Samantha Bradley	Wm. Chrisman
Corey Crandall	Ft. Osage
Mark Davidson	Truman
Tabitha Hanson	Ft. Osage
Jami Heidtbrink	Truman
Alycia Hightower	Van Horn
Eraine Khleang	Van Horn
Sharon Morris	Northeast
Lucy Moses	Southeast
Hai T. Pham	Northeast
Leah Rathbun	Wm. Chrisman
Wendy Robello	Wm. Chrisman
Kara Schumacher	Truman
Brandon Shackelford	Van Horn
Jason Shawhan	Wm. Chrisman
Lori Shipley	Truman
Jeremy Stayton	Wm. Chrisman
Joshua Titus	Truman
Eric Watts	Truman
Tracy Weber	Northeast
Kristiana Zackula	Ft. Osage

These are the total of 72 students (as of this newsletter) who will be enrolled. As usual there will be additions and deletions through September.

THE 1998-99 STAFF

In PHYSICS:

Larry Harding (retired), from Fort Osage, Jim Graczyk from Van Horn, with some assistance from our liaison Roy Cook of Northeast,

and, in CALCULUS:

Sheri Adams from Truman, and Libby Sparks from Wm. Chrisman.

Our University staff is listed in the heading of this newsletter, and our half-time secretary and assistant is Doris Kirst.

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 ($z = \cos x \cdot \sin y$) on the back and our student-designed MPI logo on the left front.

NEW (OR CHANGED) MPI ALUMNI E-MAIL ADDRESSES

[A list of known MPI Alumni e-mail addresses is available on request.]

** NEW **

- (89-90) Tracey Sterbenz
kittyonkey@ad.com
- (92-93) Rachel Allen
rallen@hntb.com
- (92-93) Shelly Carter
slcarter@cctr.umkc.edu
- (93-94) Aubrey Hanks
ahanks@lark.cc.ukans.edu
- (94-95) Brian Hampton
xmmol5B@prodigy.com
- (95-96) Whitney Meagher
w-meagher@nwu.edu
- (95-96) Aletha Wand
mike34@kdsi.net
- (96-97) Robert Monnig
c715937@showme.missouri.edu
- (96-97) Jessica Ostrom
jostrom@eagle.cc.ukans.edu
- (96-97) Sarah Thompson
c717566@showme.missouri.edu

** CHANGES **

- (84-85) Doug Bullock
bullock@math.umd.edu
- (86-87) Alan Canfield
alanc@ara.com
- (86-87) Pat Liang
patrick.liang@mci2000.com
- (87-88) Kelly (Nance) Johnson
prov31@flash.net

Continued after the Calendar →

- (90-91) Jacquelynne Morris
jmorris@vicon.com
- (92-93) Richard Fulton
fulton@ksu.edu or
nogginizer@hotmail.com
- (94-95) Rachel Roberts
rachel.roberts@vanderbilt.edu

ENRICHMENTS

FOLLOW UP

On April 17 Rachel Allen (MPI 92-93), Civil Engineer for HNTB Corp., spoke on **HIGHWAY DESIGN PROJECTS**.

Student comments were:

- She showed us how she was working on the Turnpike I-70 project in Topeka. She showed us some CAD pictures. Computer Automated Design. She told us how they had to survey the land to find the undulations of the land. This was a good report. It was short and sweet. The video of the bridge falling apart was neat.

- We learned some of the methods that it takes to rebuild a highway, and the calculus involved in such processes.

- She discussed the calculus connections to real world applications. Elevation changes in roads are parabolic.

- Her overall presentation was really understandable. I have seen the Topeka interchange she was talking about, and know that it is really confusing. Rachel then went on to talk about bridges and the different types of structures. I went downtown and saw Bartle. Our prom is there and it makes it more exciting to know that my prom took place on a bridge.

- The computer simulation of driving down the road was really neat. Lots of calculus is involved in designing roads and bridges. We saw lots of pictures of bridges. Civil engineers get to design lots of stuff. We got to see the Tacoma Narrows Bridge fall down. I would have liked to hear more about how different bridges are built, especially the one that goes under a river. I enjoyed discussing how the walkway at the Hyatt fell down.

- The Kansas interchange for East Topeka will be a more efficient highway into the next generation. For all the construction and designing, it will cost about thirty million dollars. There are various types of bridges such as cable-stay, arch, suspension, and movable. It was amazing to see the bridge called the Tacoma, roll and move up and down and side to side. This enrichment was interesting and informative. She proved to be a good speaker that was more in tune to us.

- This is the first speaker to actually prove calculus has an application in the real world. MPI can mean something!

- It is an excellent idea to bring students back to MPI after they have settled in their careers (or even before then).

On May 1 Brent Harding (MPI 84-85) an Engineer Specialist at Stanford Telecom spoke on **APPLICATIONS OF SATELLITE TECHNOLOGY**.

Students responded:

- Told us about how satellites can tell the exact positioning with respect to the earth. Defence applications, surveillance, nuclear detonation detectors on all GPS satellites. Have missiles on satellites. Refract laser beams off of satellites, environmental monitoring, ultraviolet, and infrared monitoring. Tells how well plants are growing, meteorology and climate monitoring, and Hubble space telescope. This speaker was interesting. Seeing his success being a former MPI student could motivate all MPI students to shoot for their dreams.

- He used an excellent demonstration with slinkies! He spoke of the Planet Finder, which searches for terrestrial planets, which will be launched in 2010. He was a very, very interesting speaker. I think this is the best speaker we have had! He related to the students.

- Geo-stationary satellites stay basically above a fixed point on the planet. Iridium satellites (50 or so of 'em) revolve every couple of hours or so, and are used for cell phones. Anti-satellites are basically flying

(falling?) smart bombs that blow up when they get a certain distance from other satellites. The Hubble Space Telescope is great for taking pictures of regions of space where no one has gone before.

■ It was excellent to have another former MPI student to come as our speaker. He was very interesting and knew his work very well, and was able to keep the energy of lecture high, excellent choice.

UPCOMING ENRICHMENTS

One of the special features of the MPI is its biweekly enrichment series, in which on alternate Fridays either professionals in the sciences, engineering, mathematics, etc., speak to our MPI students, or, we take a field trip to such places as the nuclear research reactor in Columbia, UMKC's Physics Dept., or Worlds of Fun for some 'hands on' physics.

As part of our early MPI orientation, Debra Gaggens of UMKC, speak on **Friday, Sept. 4** 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.)

The October 1 newsletter will report on those speakers scheduled for October and beyond. But, during the first two weeks of classes at the MPI we will spend one day discussing a topic which is vital for study and college survival. Specifically: **TIME MANAGEMENT**. This session will be presented by Augusta Nichols from UMKC's Academic Support Services on **Friday, Sept. 11**.

On Friday, **Sept. 29**, Ed Kiker, a Harvard graduate who majored in Lunar Geology, member of the National Space Society, and the CEO of Outer Space Industrial Resources Investigations Systems, will speak on **OUR FUTURE IN OUTER SPACE**.

TO THE PARENTS OF THE 1998-99 CLASS AT THE MPI

[Modified 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 MPI.

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 schools 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 fourteen years 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 MPI 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 MPI'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 MPI during our annual **OPEN HOUSE** on **Sunday afternoon, November 8, 1998**. (See the Calendar in this issue; more about this in the October newsletter.)

WE HEAR FROM PAST STUDENTS

DOUG BULLOCK (84-85)
(BA Mathematics,
PhD Mathematics)

E-mail received 4-7-98:

"My parents came to my talk in Kansas (March 27-28, 1998, Manhattan), and I spent the rest of the day with them. And I've been running all over town since I got back. Sorry I missed the newsletter. But truth be told, there's not much to be said about me in that context. I think the most interesting thing is that I am a **living mathematician**, in that I get paid to think about, create, write and explain new mathematics. If you want some color, you might mention what a nomadic existence this is, until you land with tenure at an institution. For instance, since leaving MPI I've been a student at UM-Rolla, UM-KC, U of Iowa, UC-Santa Barbara, U of Iowa again; and I've been employed in Boise Idaho and Washington DC. Maximum time in one place is 4 years. As a consequence, there is little to report on the personal side. Basically you get used to living within yourself wherever you land.

I do get to travel a bit. Here's a bit of a list for conferences. If you decide to use any of this, a bit of editing might be in order.

Evanston, IL (for a month); East Lansing, MI; Knoxville, TN; Manhattan, KS; Athens, GA (saw Michael Stipe in a bar); Los Angeles, CA; Milwaukee, WI; Boise, ID; Warsaw, Poland (for 5 weeks); Athens GA (did not see Michael Stipe, even though the conference organized a drive by of his house); Tacoma, WA; Guanajuato, Mexico (those guys know how to throw a party!); Iowa City, IA; Columbia, MO; Berkeley, CA (over and over again, working on the same paper with the same mathematician); Warsaw, Poland (again, but all it did was rain and I didn't understand any of the talks because quantum gravity guys are completely opaque); New York

City, NY; Austin, TX; Baltimore, MD; Madeira, Portugal (lovely, but eating that many shellfish does weird things to your body); New York (again. Nice town!); and Manhattan, KS (again). And I think just about all of this list happened between the two most recent times I've seen you.

Looking forward to seeing the MPI again this fall! [Doug will be a Fall Enrichment Speaker. Ed.]"

PAT LIANG (86-87)
(BS, Biochemistry;
MD, Medicine)

E-mail received 4-8-98:

"Good Grief!!! I can't believe next year represents the 15th year of MPI! I was certainly astounded by this fact in the recent newsletter and want to wish an early Happy 15th Anniversary. I know the program helped mold my education and I am sure it continues to shape the academic lives of others. Keep up the great work!!

On a more personal note, I also have now received the invitation to Richard Waring's Open House on May 3. I am overjoyed to say that I plan to attend to give him my utmost appreciation and to bid him farewell. I am bringing a guest with me so that she can meet the people who helped make me who I am today. Soon I shall refer to her as my fiancee and eventually, my wife. I look forward to seeing all of you on May 3.

Until then, Pat Liang"

TAMMY (PHELPS) TANDY (88-89)
(BS Biological Sciences)

E-mail received 4-9-98:

"We are finally getting back to a somewhat normal routine after the birth of our second child, Jessica. She will be two months old on April 11. It has been a whirlwind of events since I first started having trouble with the pregnancy back in early December. We are just thankful to be alive and are enjoying each day as it comes. James is being a good big brother most of the time. He likes to draw "big A's" (he does pretty good, too) and sings the

alphabet song at least 20 times a day.

If things work out, I should be able to get over for the retirement party. I'll do my best. I would like to see all of you before I don't remember who you are (or vice versa).

Catch ya later!

Tammy (Phelps) Tandy"

C. ALAN CANFIELD (86-87)
(BS Mechanical Engineering)

E-mail received 4-9-98:

"I just learned of the impending retirement of Prof. Waring and wanted to extend my congratulations and sincere appreciation for the immense contribution he has made to higher education for Kansas City area school district students. I am always proud to tell others of the support and dedication we received from the staff at MPI. Thank you and best wishes always!

I do enjoy the MPI Newsletter. Please make a note of my new address: Alan Canfield, 3113 Wood Valley Road, Panama City, FL 32405-4234. (Actually, I have been in Florida for 5 years, but since I just bought a house I guess I'll commit to the address change!) Please also update my email address as alanc@ara.com, in the event you don't have that address. My home email changes too frequently!

C. Alan Canfield, P.E.
MPI '87"

KELLY (NANCE) JOHNSON (87-88)
Van Horn High School Graduate

E-mail received 4-10-98:

"Well, I've managed to procrastinate on this note just like I do everything else. I meant to write to y'all as soon as I heard Mr. Waring was retiring, but I didn't get the note finished that day, it got put off, and now I can't even find it! Ah, well...

It's hard to imagine MPI without Mr. Waring, honestly. I've

read of this and that teacher coming and going, and while I was interested, it really wasn't any big deal to me. But the two Richards are part of the institution itself, aren't they?! At least you'll be sticking around for awhile, Mr. Delaware, I assume?

An update on the Johnson household: arrow number five was due on January 20 this year, but he decided he didn't like his cozy little home and actually graced us with his presence on December 23, 1997. I don't know that he made a real good decision, though, since he then had to spend two weeks in the hospital, as his lungs weren't quite ready for proper use. He needed two doses of surfactant, and after that they just watched him and made sure he was eating and growing properly before they released him. He's scheduled for his 4-month checkup later this month, and he seems to be doing just fine.

As for the rest of us: Christian just had his eighth birthday in March, and is currently working on division, sentence diagramming, and 2nd declension Latin nouns in his schoolwork. (My husband, Mark, keeps asking when he's going to be ready for differential equations... you did know I married a math major, didn't you? Rose turned 6 in February, and has finally decided she's ready to read. She can now read, "Sam sat. Mat sat. Mat sat on Sam. Sad Sam!" Actually, she can read a bit more than that now, but that was actually the text of her first book. Grace will be 4 this summer, and she is learning to read letters and the beginning phonics sounds. (She's more interested in reading than Rose ever has been.) Josiah will be 2 this summer, and he's busy just increasing his vocabulary. His favorite word, as with any toddler, is NO!, followed closely by cat, papa (mama doesn't rate), and MINE! ...

We bought a house last summer and I am discovering this spring that I have *not* suddenly turned into a green thumb just because I now have a yard to take care of! I can still kill plants with the best of them, so I'm planting bluebonnets in the flower bed in front this week. They're wild flowers, after all, and should be able to take care of themselves despite having to deal

with me. I'm much more comfortable inside with my sewing machine and a quilt in progress than I am outside with a shovel or a lawn mower.

Well, that's enough of my random rambling. I think you're up-to-date enough, anyway. It's been ten years now since I was at MPI... what is it about high school that those four years stick in your head permanently?

I feel like I was in high school longer than I've been married, even though my ninth anniversary is next month. Hmph. Well, I'm looking forward to my high school reunion, if for no other reason to see how many people's eyes boggle when they heard how many children I have. Actually, you know, it's kind of odd: when I had four children, people often stopped and looked startled, counted them, asked if they were all mine, etc., but it seems like now that I have five the responses have changed and they're much more favorable. I still get the standard comments, "You sure have your hands full!", and "Are they all yours?", but it seems like I'm bumping into more and more people with large families than I ever used to. Maybe I'm not as strange as I've always thought I was? Naaah... that can't be it.

OK I said I was going to quit rambling. I'll do that now.
TTYL, Kel"

DON WOLFGEHER (90-91)
(BS Biological Science)

E-mail received 4-12-98:

"Hello, I am finally getting around to touching base with you guys again, after receiving all of the newsletters and all...

I went through the C section of Calc in the 90-91 year with others like Mary Noah, Chris Bird, Jeremy Hammond, etc. After that I went to UMC in Columbia.

Started here as bio-chem engineer but thought then it was too hard, so I changed to art, but then I needed a major that would make money, so I changed again to biology. Boy was that stupid, it is much too broad of a major. But I do have a B.S. in Biology with an emphasis in Molecular Biology or Genetics and Entomology or

the study of insects. But after graduating with that degree I needed to go to grad school to do anything with it. I liked the genetics but also realized that I always like computers. So now after working for a year out of college I am back. Working currently on a second bachelor's degree this time in Computer Science. I should be able to transfer into the masters program half way through or next year.

To support this collegiate habit of mine, I work at the Boone Hospital in the Laboratory, helping the Pathologists in the frozen room, which consists of preparing slides for surgical cases when the docs are concerned about cancer and whether it is there and/or malignant or not, and I also set up their Gross for them and organize their work to keep them happy. I also work in the general lab doing specimen collections and such.

The computer degree is going well. I still keep in contact with Mary Noah. Just wanted to let you guys know that the MPI program helped a lot and was a wonderful addition to my life. Also I have to take Calc II, and III and some more math next semester and the following. And I thought I was through. It has been many a year since I have taken math, I hope it comes back...

I would be interested in doing one of the speaking things sometime... just let me know when, where, etc.

This email will stay constant for at least 3 years. Take care!"

KIMBERLY LOVITCH (91-92)
(Ft. Osage High School Graduate)

"I really enjoyed the classes I took at MPI. The material I learned helped me a great deal with the courses I took at Naval Nuclear Power School in Orlando, FL, studying for Electronics Technician status. I feel that what I learned at MPI gave me a good background for the math and physics courses that were required. Thanks!"

AUBREY HANKS (93-94)
(BA Psychology)

"The courses I took at MPI were especially challenging and enjoyable. I have been challenged at a similar level in both my undergraduate and graduate level courses, but it is rare to get the individual attention in these courses that MPI offered me.

MPI helped me to learn how to study and prepared me for the demands of college. It was a wonderful stepping stone into a full-time college status. Also, at the undergraduate level I was a minor in Chemistry. The Calculus and Physics courses provided me with a "scientific mindset" and basic scientific principles with which to approach my chemistry courses and have fun with them.

I really enjoyed MPI for both the educational and social opportunities. At MPI, I made friends that I still have and was able to meet other people my age from around the KC area. I feel very fortunate to have had the level of instruction that I did, while still in high school. My recommendation would be to continue and/or increase the use of computers in the courses. Familiarity with computers, beyond mere word processing, is high beneficial in college."

RACHEL ROBERTS (94-95)
(Computer Science and International Communications Major)

"The Calc I & II at MPI far surpassed my Calc III course at Vanderbilt. I really appreciated the use of graphing calculators and Derive at MPI, because they allow for faster conceptual progress when used to supplement the learning and as a self-check to verify answers. My course at Vanderbilt was taught by a grad-student TA who was not nearly as experienced in teaching clear methods as Mr. Delaware.

MPI taught me I had to work hard to study on my own, without collected homework or other external impetus. It taught me the value of reading lecture material ahead of lecture time. Basically, it prepared me for college in a way that no high school course can. It was invaluable to my success in college."

ALETHA WAND (95-96)
(Undecided Major)

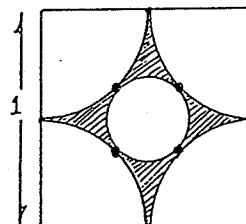
E-mail received 4-8-98:

"Hey, you guys have really taught me a lot. I know that when I do go to college, that I will not be able to procrastinate. Good luck to you both. In the recent newsletter, Amanda B. was right, no matter what kind of trouble we caused, especially, Amanda and I in Mr. Morse's class, we really do appreciate everything you've done for us. Thanks a lot, and on May 3rd (R. Waring Retirement Party), I'm there for you."

A SOLUTION TO MATHEMATICS CHALLENGE #53

Recall the problem statement:

Suppose you threw a dart at random into the dart board shown below:



This dart board is a square of side 1, the arcs are circular arcs from 4 identical circles each of radius $1/2$, centered at the 4 corners of the square, and the center circle meets these 4 circular arcs at their midpoints as shown.

What is the probability (in %) that your dart will land in the shaded region?

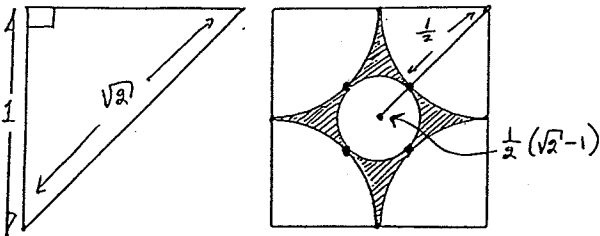
How does this probability vary if the 4 identical circular arcs shrink together in radius from $1/2$ down to 0, while the center circle correspondingly grows?

[This is an example of a geometric probability problem.]

SOLUTION:

a. The probability that the dart will land in the shaded region can be interpreted geometrically as what proportion that region takes up of the square's area. Since the area of the square is 1, this means our probability just equals the area of the shaded region.

Now, the diagonal of the unit square is of length $\sqrt{2}$, and the equal corner quarter-circles have common radius $1/2$, so the center circle which touches all four quarter-circles has radius $(1/2)(\sqrt{2} - 1)$ as shown below:

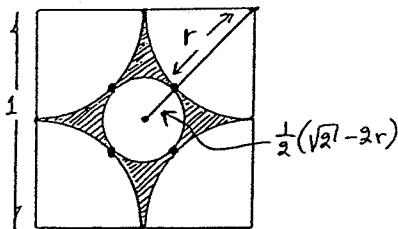


Recalling that the area of the square is 1, and the four quarter-circles form one circle of radius $1/2$, we have:

Probability of the shaded region

$$\begin{aligned}
 &= \text{Area of the shaded region} \\
 &= 1 - \text{Quarter-circles} - \text{Center circle} \\
 &= 1 - \pi(1/2)^2 - \pi[(1/2)(\sqrt{2} - 1)]^2 \\
 &= 1 - (\pi/4)[1 + (2 - 2\sqrt{2} + 1)] \\
 &= 1 - (\pi/4)[4 - 2\sqrt{2}] \\
 &= 1 - (\pi/2)[2 - \sqrt{2}] \\
 &\approx .0798 = 7.98\%
 \end{aligned}$$

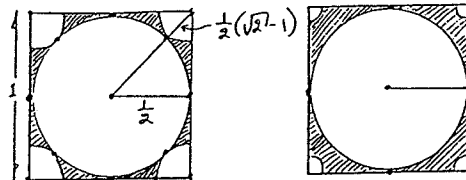
b. Next, let "r" be the common radius of the quarter-circles, so the solution above represents the maximal case $r = 1/2$. To examine here the behavior for all $0 \leq r \leq 1/2$ under the stated conditions, we generalize the probability above as shown below:



Probability of the shaded region

$$\begin{aligned}
 &= 1 - \text{Quarter-circles} - \text{Center circle} \\
 &= 1 - \pi r^2 - \pi[(1/2)(\sqrt{2} - 2r)]^2 \\
 &= 1 - \pi[r^2 + (1/4)(2 - 4r\sqrt{2} + 4r^2)] \\
 &= 1 - \pi[2r^2 - r\sqrt{2} + 1/2].
 \end{aligned}$$

However, this formula only holds until the simultaneously-growing center circle touches the sides of the square, which occurs when r shrinks to the value $r = (1/2)(\sqrt{2} - 1) \approx .207$, as shown below:



For the remaining values of r, $0 \leq r < (1/2)(\sqrt{2} - 1)$, the center circle has a fixed radius $1/2$, hence unchanging area, in which case we have:

Probability of the shaded region

$$\begin{aligned}
 &= 1 - \text{Quarter-circles} - \text{Center circle} \\
 &= 1 - \pi r^2 - \pi(1/2)^2 \\
 &= 1 - \pi(r^2 + 1/4).
 \end{aligned}$$

Finally, putting these two results together, we have that:

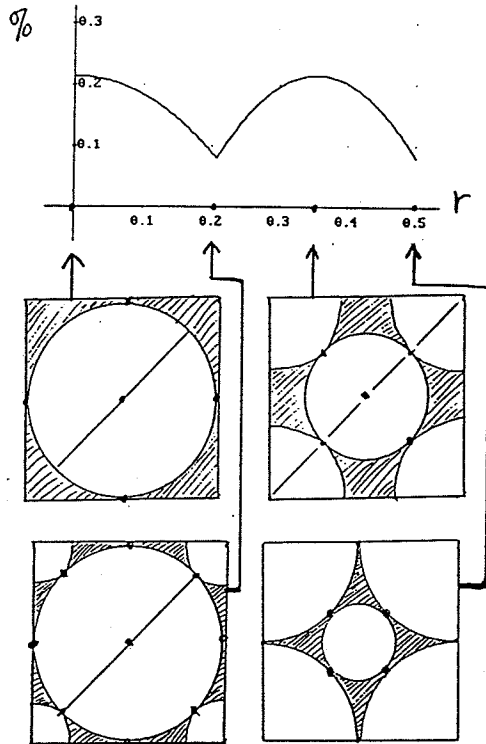
Probability of the shaded region

$$= \begin{cases} 1 - \pi[2r^2 - r\sqrt{2} + 1/2], & \text{for } (1/2)(\sqrt{2} - 1) \leq r \leq 1/2, \\ 1 - \pi(r^2 + 1/4), & \text{for } 0 \leq r \leq (1/2)(\sqrt{2} - 1). \end{cases}$$

where r = the common radius of the quarter-circles.

This piecewise behavior is revealed in the graph below. Notice that:

- Maximum probability = $1 - \pi/4 \approx .214 = 21.4\%$ when either $r = 0$ or $(1/4)\sqrt{2}$, and
- Minimum probability = $1 - (\pi/2)[2 - \sqrt{2}] \approx .0798 = 7.98\%$ when either $r = (1/2)(\sqrt{2} - 1)$ or $1/2$, the "boundary" value, or the case in part "a":



A SOLUTION TO PHYSICS CHALLENGE #44

Recall the problem statement:

The box of a well-known breakfast cereal states that one ounce of the cereal contains 110 Calories (1 food Calorie = 4186 Joules). If all this energy could be converted by a weight lifter's body into work done in lifting a barbell, what is the heaviest barbell that could be lifted a distance of 2.0 meters?

SOLUTION:

The energy available in one ounce of the cereal is (110 calories)(4186 J/calorie) = 4.6×10^5 Joules. The work (W) done in lifting a barbell a height (h) of 2.0 m is $W = mgh$.

If all the available energy was converted to work done in lifting the barbell its mass would be given by:

$$mgh = 4.6 \times 10^5 \text{ J}$$

$$m = \frac{4.6 \times 10^5 \text{ J}}{(2.0)(9.8)}$$

$$= 2.3 \times 10^4 \text{ kg}$$

This corresponds to a weight of 2.3×10^5 Newtons or 52,000 lbs!

This answer is beyond belief. In reality only a small fraction of the energy available in the cereal can be converted into work.

[From: Cutnell/Johnson Physics, 3rd Edition, problem 43, p. 358.]

MATHEMATICS CHALLENGE #54

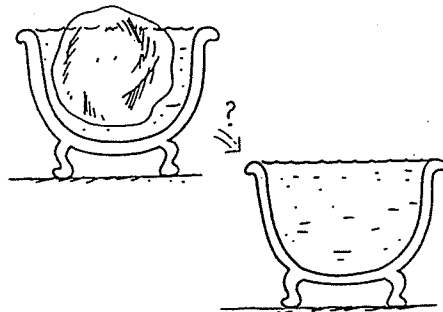
Imagine a polyhedron with 1999 vertices (corners). Then imagine that each edge is assigned an electrical charge of +1 or -1.

Explain why there must be a vertex such that the product of the charges of all the edges that meet at that vertex must be +1.

[Due to Mašek; recorded in Techniques of Problem Solving, by Steven G. Krantz, 1997, Problem 1.6.4, p. 39.]

PHYSICS CHALLENGE #45

This is a bathtub brim full of ice-cold water with an iceberg floating in it. When the iceberg melts, will the water in the tub: a) go down a little, b) spill over, c) stay exactly brim full without spilling?



[From: Thinking Physics, Practical Lessons in Critical Thinking by Lewis Carroll Epstein, p. 187]

Editor/Writer: Richard Delaware

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