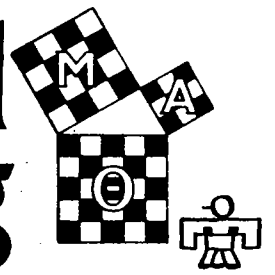
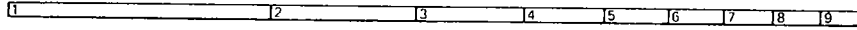


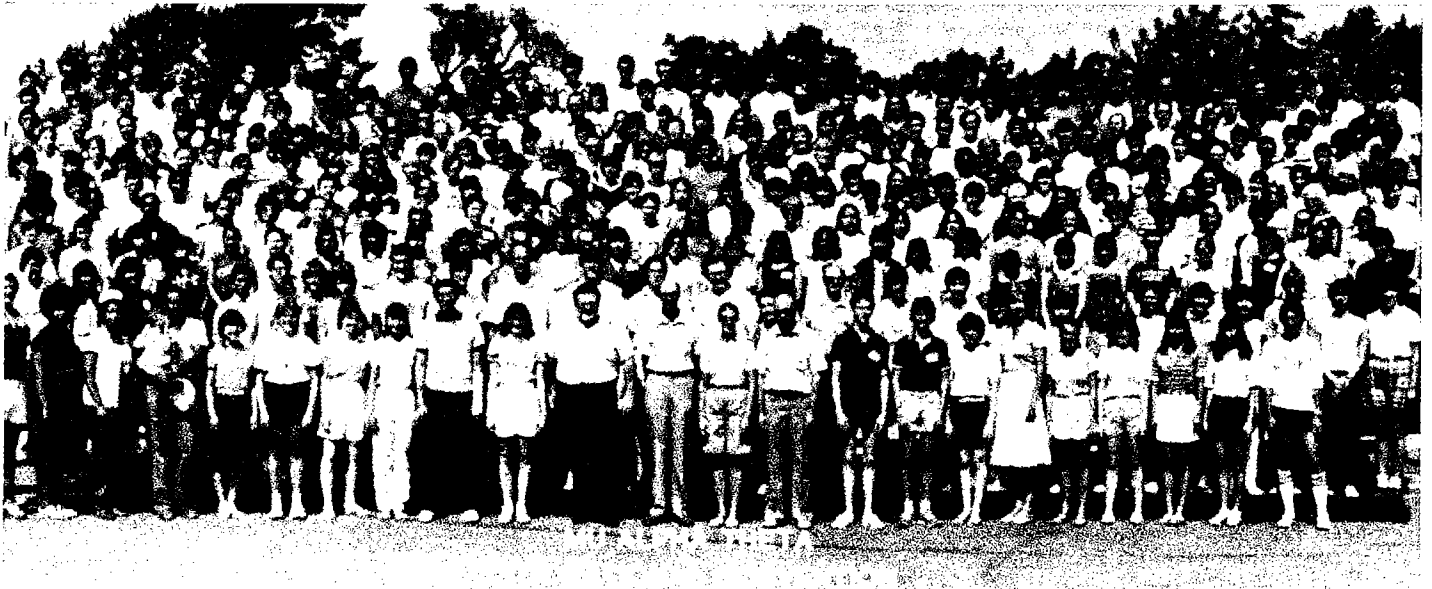
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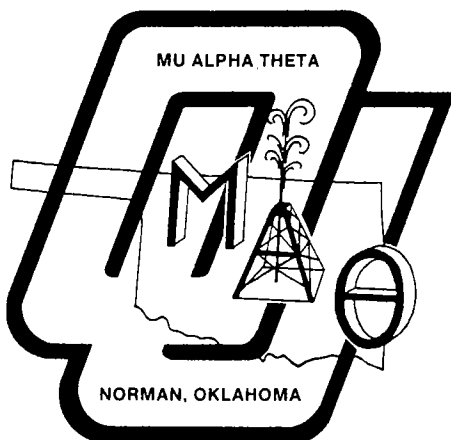


MU ALPHA THETA IN OKLAHOMA



COMING HOME TO OKLAHOMA where the national organization was founded over 25 years ago, Mu Alpha Theta sponsors and student members--by the hundreds--assemble for a group photograph. The occasion was the 13th National Convention, the first to be held on the 'OU' campus where permanent offices of the "national mathematics club" are situated. Three full days of talks, contests, educational excursions, and social events made for a memorable experience.

'Abundance of Ideas' Highlights Outstanding Oklahoma Meet



"A very enjoyable event" with "an abundance of ideas for Mu Alpha Theta chapters." That was how Dianne Barnes saw our 13th National Convention, held at University of Oklahoma, Norman, from July 31 to August 3. Chapter president at Saint Vincent-Saint Mary High School, Akron, OH, Dianne, a Convention "regular" in recent years, was one of several Mu Alpha Theta enthusiasts who responded to the invitation to share Convention reactions.

"Reviving and expanding mathematical skills that had been dormant most of the summer" was "difficult, but not too painful," with the help of speakers, student activities, and contests.

As a chapter president, Dianne was particularly interested to learn "what other chapters do that our chapter could try." She noted that "advisors and students were willing to share their chapters' 'success stories' and to offer helpful suggestions."

"Outstanding speakers--including Zal Usiskin and OU's "Doctor Indestructo--and difficult competitions" were part of the fun and the challenge that makes Convention time "the peak of the year" for Mu Alpha Theta enthusiasts, according to Matt Deatherage, El Reno, OK.

New Orleans for 1984 ... page 2



The Mathematical Log

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New Orleans for 1984

They're planning an outstanding 14th National Convention--with a World's Fair as possible bonus--for Mu Alpha Theta convention-goers in New Orleans in 1984. With a strong program and top speakers, good university facilities, and unbeatable opportunities for sightseeing and exploration, Convention '84 gives every indication of being a chance too good to pass up. Claudia Carter, Convention Chairman (address above), confirms at Log deadline that the host campus will be

Tulane University and Convention dates August 1-5. The Convention will officially get underway at 8 a.m. on August 2. Groups wishing to "take in" the World's Fair can arrive the previous day and avail themselves of campus facilities.

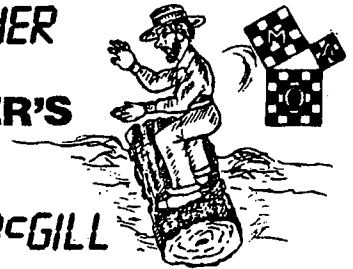
The Audubon Zoo is across the street from the University, and other attractions of the City and the River are not being overlooked.

Even as we congratulate Norman High School and Putnam West High School on providing an outstanding Oklahoma Convention and a hard act to follow, we note the planning and organization that are going into our 1984 New Orleans gettogether--and urge that this, too, is not one you'll want to miss!
 H.D.A.

PROBLEM CORNER

LOGMASTER'S CHOICE

with CAROL MCGILL



(The Mathematical Log launches with pride "Logmaster's Choice," its continuing "Theta"-sequence of mathematical and related problems selected for Mu Alpha Theta challenge and enjoyment. Problem proposals and solutions will be welcomed by our Problems Editor, Dr. Carol McGill, 4405 Rue Des Fleurs, Orange, TX 77630. Submit responses promptly. Solution notes and names of successful solvers will be featured in subsequent Logs or Tall Timbers. --H.D.A.)

Carol McGill writes:

Some of the more interesting problems are those which call for perseverance and logical thinking. In this spirit, we open "Logmaster's Choice" by posing the following such problem. Read carefully. At first glance this question may appear the same as a problem with a trivial solution, one that has been around for many years. But this version has a subtly different slant, and as a result a somewhat more difficult solution.

THETA-1

Finding the Odd Ball

Proposed by the Problems Editor

You possess a balance scale capable of showing only equal or unequal weights. You also have 12 balls. Eleven of the balls have exactly the same weight. The twelfth ball has a different weight, and you do not know if it is heavier or lighter. Using only three weighings you wish to locate the "odd ball" and to determine its weight relative to the others (heavier or lighter).

Another problem involving only logic and elementary calculations is the following.

THETA-2

Dividing the Oranges

Proposed by the Problems Editor

A Christmas party was planned by the local high school's Mu Alpha Theta chapter for an orphanage. The chapter had received a gift of oranges from a local grocery store. Being potential mathematicians,

(Continued on page 4)





dia Log ue



with Log Editor Don Allen

"I was only wrong wunst, and that was whin I thought I was."

One of those mind-bending statements to attack and dissect in a unit on logic and reasoning? No, not really! The "statement" illustrates "proper use" of the word "wunst" in the "Talkin' Redneck Style" chapter of Kathryn Jensen's Redneckin' paperback (Perigee Books, 1983), acquired at the "OU" bookstore and a distinctive memento of our introduction to Oklahoma and to Mu Alpha Theta's home campus. When we travel, particularly into what for us is a new area of this vast continent, we do confess a weakness for regional memorabilia ... hence the literary acquisition. And while we didn't spot the "Have You Hugged Your Truck Today" bumpersticker (p. 93), Mu Alpha Theta enthusiast Matt Deatherage (EL Reno, OK) did give us a good perspective on Norman and surroundings in his pickup ... one evident extrapolation of the old frontier. As Ms. Jensen (an OU doctoral candidate) sagely observes (p. 91), "While a pickup ain't no horse, it's the closest thing to it nowadays."

* * *

How do you make a hippopotamus float? What's red then purple, then red, then purple ...? What has 18 legs, is covered with red spots, and catches flies?

Good questions, of course, but hardly what one has come to expect of Martin Gardner, mathematics popularizer par excellence. Gardner has, nonetheless, assembled an improbable but memorable assortment of low-key fun and games in his Perplexing Puzzles and Tantalizing Teasers (An Archway Paperback, 1971), which we chanced upon in a bookstore this summer. To those who already know Gardner through his Scientific American "Mathematical Games" contributions and his related hardbacks and paperbacks, this one should seem differ-

PHOTOS. Our 1983 official National Convention photograph (p. 1) is by Panoramic Productions, Oklahoma City. Other photos this issue are by the Editor. The Log welcomes photographs depicting chapter personalities and activities.

ent, for its intended audience is different. But it does stress thinking, reasoning (of a sort!) ... and watching out for tricks.

Farmer Higgs owns three pink pigs, four brown pigs, and one black pig. How many of Higgs' pigs can say that it is the same color as another pig on Higgs' farm?

For humane reasons, answers are given at the conclusion of this "diaLogue."

* * *

Given a positive, whole number in usual base-ten notation, form a new number by squaring and then adding the digits of the whole number. Repeat the process, and consider the sequences (indeed, cycles) of numbers that can result. Coining the term "sum of square digits" or "SSD" operator, Australian mathematician John Scheduling discusses the merits of such a mathematics-learning experience in a recent Two-Year College Mathematics Journal (the MAA publication). As possible grist for

the Mu Alpha Theta chapter will (or a good independent study) seek out "SSD Persistence: A Mathematical System for Student Investigation," TYCMJ, 14:4 (September 1983), pp. 309-12, particularly the "pictures worth 10³ words" overviews on p. 312.

* * *

Gardner's answers, for the record...

With some root beer, two scoops of ice cream, and a hippopotamus.

A cherry that works at night as a grape.

A baseball team with the measles.

None. Pigs can't talk.

Which, come to think of it, makes Gardner's teasers at least as much fun to work backwards as forwards. Not unlike some mathematical problems.



RIGOROUS PROOF that $2 = 1$, on a T-shirt? As spotted at St. Louis convention, such "academic" T-shirts come with a wide range of "messages." One source, sponsors report, is the Journal of Academic T-Shirts, sales catalogue of Outer Products, Box 88, Lafayette Hill, PA 19444.

Student Assembly

Did you know that you are represented by a Student Delegate Assembly at each Mu Alpha Theta national convention?

The objectives and functions of this Student Delegate Assembly are (a) to advise the Mu Alpha Theta Governing Council at its annual meeting; (b) to serve as a forum for the exchange of ideas concerning Mu Alpha Theta and Assembly recommendations.

Each Mu Alpha Theta chapter is entitled to one representative at each Assembly. If your chapter will be sending teams or individuals to New Orleans Convention in 1984, then you should elect one of them to represent you at the Assembly.

Student Delegate Assembly president is Kathy Bernal, Blessed Sacrament Academy Mu Alpha Theta, 1135 Mission Rd., San Antonio, TX 78210.



OKLAHOMA INDIAN SYMBOLS lend a distinctive air to Log margins this issue ... but also serve to encipher a well-known math-related quotation.



142 Submissions

'Prime Guessing' Contest Response
Prompts 'Fibonacci Number' Encore

Pick a three-digit prime number, 101 to 997. You "win" if you choose the largest prime number which no one else has seen fit to select.

Should you, wishing to win, make your choice 997 itself?

Of course not. Others would be bound to pick it, and automatically you'd lose. Thanks to such reasoning, no one did select 997 ... so, indeed, in choosing it, you could have won!

As it turned out, 991 (the second largest allowable prime) won this battle of number-theoretic applied psychology ... for Joe White, a student at East Fairmont High School, Fairmont, WV. Joe, accordingly, is declared winner in The Mathematical Log "Prime Guess Contest" ("dialogue," April 1983). Some 142 submitted guesses-on-a-postcard ranged from 103 to Joe's 991, Contest scrutineers report.

"Prime guessing" particularly captured the imagination of two active Mu Alpha Theta schools, returns suggest. Sr. Mary Ann Wheaton, faculty sponsor, sent in the collective guess of Bishop Ward High School chapter, Kansas City, KS, namely 743. Too low to win! Students at East Fairmont--scores of them!--submitted individual guesses, including (by coincidence) Michelle Cline's 743.

Joe White, who sent his winning "991" on an Etam West Virginia Earth Station picture postcard, receives the highly distinctive promised prize--suitable for framing, a crisp (Canadian) \$5 bill with an 11-digit prime serial number ... 30246651937.

The real challenge in the Log "Prime Guess" was in locating the prime-serial banknote to serve as prize. Here's how it was done. First, access was arranged to crisp, preferably consecutive, banknotes, lots of them. Banker William Reynders at The Continental Bank of Canada (where the Editor's chapter maintains its account) special-ordered \$2000 in new fives. Leafing

If in the three edges of a cube which meet in a point O, points A, B, C, be taken which are distant a, b, c, from O, the area of the triangle formed by joining A, B, C, is

$$\frac{1}{2}(a^2b^2 + b^2c^2 + a^2c^2)^{\frac{1}{2}}$$

--Snowball, Plane Trigonometry, 1839.

through the bills, obvious and not-so-obvious composites were eliminated and "possible primes" set aside for computer consideration. Log Mathematics Editor Dr. Ali R. Amir-Moéz sought out Texas Tech colleague Dr. Robert Byerly to computer-check a working list--quickly eliminating, for example, 30246651983 (which we spent) as divisible by 31541. Mu Alpha Theta co-founder Dr. Richard V. Andree did an independent computer check at University of Oklahoma. Eleven-digit numbers are, of course, too large to be "cracked" directly by factor tables or sought in standard tables of primes.

Joe's winning \$5, No. **30246651937**, passed both computer tests!

A Log contest eliciting such response and support (a 34 mm postcard stack!) calls for an encore, of course. As promised at Norman Convention, we offer a similar "outguessing" psychological number game ... but with an infinite, rather than finite, set of possible responses.

Looking to an instructive and deservedly popular set of positive integers, recall (or meet here) the

so-called Fibonacci numbers, successive terms of the remarkable sequence 1, 1, 2, 3, 5, 8, Each term after the 2nd is the sum of the two preceding terms. (The 7th Fibonacci number, accordingly, is 5 + 8, or 13; the 8th, 8 + 13, or 21; and so on.) Your contest challenge: choose and send on a postcard a Fibonacci number (apart from the initial 1s) which will be the least such number to be submitted by exactly one person!

Submit contest entries, one to a postcard, to "Fibonacci Challenge Contest," Mu Alpha Theta, Teachers College, Box 810, Truro, Nova Scotia B2N 5G5, Canada. Have entries in the mail by 31 January. Contest results should be available for the April Log.

The prize? Mostly the distinction and satisfaction of winning, of course ... but our computer printouts do reveal a second 11-digit prime-serial crisp \$5 bill! Good guessing, and good Fibonacci exploration!

PROBLEM CORNER FROM PAGE TWO

the members were trying to divide the oranges evenly among the gift stockings. However, an attempt to put 10 oranges in each stocking resulted in one stocking getting only 9; an attempt to put 9 in each stocking resulted in one stocking getting only 8. This situation continued through 7 (one stocking got only 6), 6, 5, 4, 3, 2--each case resulting in one stocking getting one less orange than the others. Question: how many oranges were given the chapter to begin with?

A further problem that calls for organized thinking can be approached from first principles. The question actually is one in integer partition, a combinatoric topic. The problem updates Problem 3927 (December 1982), School Science and Mathematics.

THETA-3

The Puzzlist's Selections
Proposed by the Editor-in-Chief

An American puzzlist, vacationing in Canada, finds new, higher postal rates and a new series of postage stamp denominations. Mailing a picture postcard home now will require 37¢. Available stamp denominations are 1¢, 2¢, 3¢, 5¢, 10¢, 20¢, 32¢, and 37¢. The postcard, when addressed, will have space for up to six such stamps. Our puzzlist, however, never uses more than 3 stamps of a denomination. Order of selection being immaterial, in how many acceptable ways can one or more stamps be chosen to the required value of exactly 37¢?

Number theory is one branch of mathematics in which elementary questions can, on occasion, give rise to great difficulties in solution. The following questions arose in preparing materials for an introductory course in number theory. They are not difficult, but do lead into worthwhile explorations. They first were published in "Mathematics Centre," Newfoundland Teachers' Association Journal, April 1973.

THETA-4

Primes and Composites
Proposed by the Editor-in-Chief

Prove or disprove:

(a) If P_1, P_2, P_3 are distinct primes, then

$$P_1P_2 + P_2P_3 + P_3P_1 \text{ is a prime.}$$

(b) If P_1, P_2, P_3 are primes greater than 3, then

$$P_1^2 + P_2^2 + P_3^2 \text{ is composite.}$$

CONVENTION FOLLOW-UP

East Texas Bayous to Laurentian Foothills Informal 'Exchange' Study in Contrasts

Mu Alpha Theta conventions, regional and national, above all else, bring together young people who share a healthy range of interests and enthusiasms. Math is but one of them! Follow-ups on convention-based friendships could, your editors suspect, provide the raw material for many a story. This summer, Courtney McGill, 15, of Orange, Texas, and Elizabeth Allen, 16, of Truro, Nova Scotia (who spends July and August in Canada's Québec province), exchanged visits. (Courtney and Elizabeth met at Mu Alpha Theta's 1981 National Convention at U.C.L.A.) This special report is based primarily on the girls' written accounts.

by Don Allen

Catlike, but for the apparent absence of ears, the sleek, brown mammal head broke the unrippled surface of the remote tree-bordered pond. All but submerged, the large, stream-lined rodent left in its wake a graceful arc of rapidly spreading waves. (What curve, I wondered, what kind of equation?) Evening was approaching and fierce mosquitoes ascending, so undue lingering, however tempting, would have been injudicious. The lonely, deep-woods setting and the rugged, unspoiled beauty were memorable, however--the Canada (and its national animal, the beaver) that casual visitors, and most Canadians, seldom if ever get to see.

The month was August, the week after Mu Alpha Theta's highly successful Oklahoma convention, six states and two provinces away. In the Laurentian foothills of Québec province, north of Montréal, the August nightfall, fairly predictably, brought with it a damp chill. With me, in this fascinating if improbable outdoor setting, were two youthful Mu Alpha Theta enthusiasts, fresh--by overnight Greyhounds--from University of Oklahoma campus activities. One was Courtney McGill, of Orange, TX. Courtney's father is an engineer and research scientist. Her mother is math teacher (and Log Problems Editor) Carol McGill. The other was our daughter, Elizabeth, home (by way of Oklahoma) from an East Texas July stay with the McGills.

WOW! THERE IS SO MUCH TO SAY. I REALLY FELL IN LOVE WITH TEXAS. --ELIZABETH.

The informal "student exchange" had had its math-science bias, as might be expected. Elizabeth spent an outstanding day at Houston's Johnson Space Center. Courtney routed her travel through Toronto, CN Tower, and Ontario Science Centre--"I could have used another day!" But, equally, the exchange permitted insights into people and their ways, a grass-roots perspective of the diversity within uniformity that characterizes North American life.

Two weeks before the wary beaver had surfaced and cruised his pond in the Québec wilderness, Elizabeth, half a continent away, had

realized one ambition of her East Texas sojourn. She had seen a wild alligator in bayou country ... "only a baby, five feet long, but still I'd not want to meet up with him while

WE DROVE UP AND DOWN THE BAYOU. "STOP THE CAR," I SAID. I HAD SEEN THE ALLIGATOR!
--ELIZABETH.

swimming in unfamiliar waters" ... and also an armadillo. She reported "close encounters" with giant cockroaches and "crawdads." She wrote knowingly of snakes that were to be found in the streets when it rained, and which sometimes came up on the lawns.

ONCE, I HAD A CLOSE ENCOUNTER WITH A GIANT COCKROACH. I HAD NEVER SEEN A BUG SO LARGE! IT RATHER SCARED ME.
--ELIZABETH.

To Courtney, one source of surprise was the Editor's idea of country relaxation after the hot pavement of Montréal streets ... strolling barefoot through cool, garden grass that might harbor a bee or two but that never had known a scorpion or poisonous spider or snake.

Laurentian days, for both girls, were filled with long hikes on country roads and wooded trails. Nights were for chatter, by the water or in early beds. One rural visit was to a recreated nineteenth-century French Canadian village. Another was to a bustling roadside flea market. Still another was to an outdoor water slide, the exuberant splashes being in hot summer sun but chill mountain air.

IT IS REALLY BEAUTIFUL. IT'S SO PEACEFUL. THE LAKE IS SO CLEAN AND CLEAR, AND THE MOUNTAINS IN THE BACKGROUND MAKE IT MAGNIFICENT. THE ONLY PROBLEM IS THAT IT WAS REALLY COLD.
--COURTNEY, ON RURAL QUEBEC.

Elizabeth recalled, in marked contrast, the long stretches of beach, the pounding surf, the hot sun ... "and the lifeguards," on a Galveston excursion. "The sun was so much stronger than what I was used to."

Courtney, in return, could join Elizabeth and family members in exploring two of North America's most remarkable cities, Toronto and Montréal. She rode Toronto's streetcars and subways, visiting a variety of noteworthy locations. Montréal shopping--and browsing in shops--extended to St. Catherine Street department stores, the extensive Place Ville Marie "underground city," and diverse "exclusive" boutiques. Evening brought a leisurely climb by path and stairs to the top of Mount Royal, with joggers in the mist, city lights below, and a panorama that can extend to mountains of Vermont and New York states.

The "exchange" ended, accordingly, with a day of comparing insights and "writing up" ex-

(Continued on page 6)