Puzzle Corner

INTRODUCTION

"Puzzle Corner" first appeared in *Tech Engineering News* in 1965 and in 1966 began to appear in *MIT's Technology Review.* Unfortunately for me, *Tech Engineering News* stopped publishing after a few years and I didn't keep the 1965-66 issues. I would certainly appreciate anyone sending me any copies they might find when cleaning out their basements.

Due to space limitations, the January/February 2000 issue of *Technology Review* contained only one regular problem. As a result this issue contains only one solution.

PROBLEMS

MAY/JUNE 1: Jerry Grossman sent us the following bridge problem that he reports actually occurred:

West	North	East
	♠ Ax	
	♥ AJxx	
	♦ xxx	
	♣ A10xx	
♠ xx		♠ xx
♥ Qxxx		♥ Kxx
♦ Jxx	**South**	♦ Qxxx
♣ Jxxx	♠ KQJxxxx	♣ Qxxx
	♥ xx	
	♦ AKx	
	♣ K	

The contract is six spades with South declarer, and the opening trick is low club, low from dummy, queen from East, King. This enables you to make the hand. How?

MAY/JUNE 2: I became lactose intolerant a few years ago and so the following problem from Ken Rosato is painful for me to type.

Recently a pizza company advertised a special deal offering two pizzas, each with up to five toppings, for one low price. They added that the pizzas on special did not need to have the same toppings on them, and that there were 1,048,576 possible different combinations of toppings for the two pizzas. Assuming a topping can be used only once per pizza, how many different toppings does the pizza company have?

MAY/JUNE 3: We end with a dissection problem from Richard Hess that, as far as I can tell, has nothing to do with gross anatomy.

For a unit-sided equilateral triangle, what is the minimum cut-length to dissect the triangle into four parts of equal area?

Richard also asks, for a unit square, what is the minimum cut-length to dissect it into five parts of equal area? What about an equilateral triangle dissected into five parts?

SPEED DEPARTMENT

The "fill in the blanks" speed problems from my former colleague, Rob Bianchini, have been popular and have inspired David Cohen to send in a bunch more. You are to replace the initials with the correct words to form a particular phrase. For example the answer to "16 = O. in a P." is "Ounces in a Pound."

26 = L. of the A.
7 = W. of the A. W.
1001 = A. N.
12 = S. of the Z.
54 = C. in a D. (with the J.s)
9 = P. in the S. S.
88 = P. K.
13 = S. on the A. F.
32 = D. F. at which W. F.
18 = H. on a G. C.
90 = D. in a R. A.
200 = D. for P. G. in M.
8 = S. on a S. S.
3 = B. M. (S. H. T. R.)
4 = Q. in a G.
24 = H. in a D.
5 = D. in a Z. C.
1 = W. on a U.
57 = H. V.
11 = P. on a F. T.

SOLUTIONS

JANUARY/FEBRUARY 1: Nancy Burstein's son Richard ('02) wonders how many four-dimensional hyperspheres one can fit in a four-dimensional unit hypercube.

This is not an easy problem; the solution below is from Richard Burstein.

Consider the four little circles you could fit inside a square. Looking along the diagonal of the square (whose length is $\sqrt{2}$), you have "used up" a length of 1 inside the circles, while the rest of the diagonal is evenly divided among (a) wasted space at the two corners of the square, and (b) a length that goes through the concave diamond in the middle. So the interstice in the center of the square has a "diameter of $(1/2)(\sqrt{2} - 1)$, in the sense that you could squeeze in another little circle with that diameter.

The diagonal of a cube is $\sqrt{3}$, and the diagonal of a 4-dimensional hypercube is $\sqrt{4}$ or 2.

The segment of the long diagonal of the hypercube that goes through the "concave diamond" in the middle, after you've put in the 16 hyperspheres, is therefore of length $(1/2)(\sqrt{4} - 1) = 1/2$: exactly the right size to allow you to fit in the 17th hypersphere.

BETTER LATE THAN NEVER

SEPTEMBER/OCTOBER 2: Robert Olness notes that the solution to this problem—involving the moment of inertia of a thin, homogeneous spherical shell of mass M and radius R—takes a simpler form if one works with density rather than mass. And, if the ground rules permit a bit of calculus, Robert said an even more direct solution can be obtained.

OTHER RESPONDERS

Responses have also been received from T. Harriman, K. Rosato and J. Serrao.

PROPOSER'S SOLUTION TO SPEED PROBLEM

Letters of the Alphabet
Wonders of the Ancient World
Arabian Nights
Signs of the Zodiac
Cards in a Deck (with the Jokers)
Planets in the Solar System
Piano Keys
Stripes on the American Flag
Degrees Fahrenheit at which Water Freezes
Holes on a Golf Course
Degrees in a Right Angle
Dollars for Passing Go in Monopoly
Sides on a Stop Sign
Blind Mice (See How They Run)
Quarters in a Game (Quarts in a Gallon)
Hours in a Day
Digits in a Zip Code
Wheel on a Unicycle
Heinz Varieties
Players on a Football Team

Send problems, solutions and comments to Allan Gottlieb, New York University, 715 Broadway, 10th floor, New York, NY 10012, or to gottlieb@nyu.edu.

— *Edited by Owen W. Ozier '98*

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