I begin with a personal note. This summer while on vacation at Sandy Island, a family camp on Lake Winnipesaukee run by the Boston YMCA, I celebrated my 60th birthday. As a surprise, I hid out before the campwide dinner and donned an “outfit” consisting of a (very large) diaper, bib, baby mask, bottle, pacifier, and an undershirt on which I wrote, “You are only as old as your act.” Although pictures were taken, my younger son would disown me if I put them on the Web. So you will have to use your imagination to guess what I looked like.

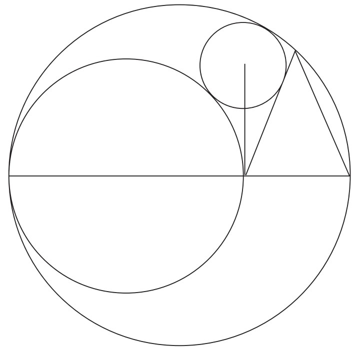
It has been a year since I reviewed the criteria used to select solutions for publication. Let me do so now. As responses to problems arrive, they are simply put together in neat piles, with no regard to their date of arrival or postmark. When it is time for me to write the column in which solutions are to appear, I first weed out erroneous and illegible responses. For difficult problems, this may be enough; the most publishable solution becomes obvious. Usually, however, many responses still remain. I next try to select a solution that supplies an appropriate amount of detail and that includes a minimal number of characters that are hard to set in type. A particularly elegant solution is, of course, preferred, as are contributions from correspondents whose solutions have not previously appeared. I also favor solutions that are neatly written, typed, or sent via e-mail, since these produce fewer typesetting errors.

Problems

DEC/JAN 1. Jorgen Harmse offers us a chess problem with the common requirement that White is to play and win. The board is oriented normally, e.g., the white pawn is on the seventh rank.

DEC/JAN 2. Phil Cassady has sent us a plane geometry problem reportedly solved by Japanese scholars a century ago.

Upon the diameter of a large circle place two shapes: an isosceles triangle and a smaller circle. Position the triangle so its base lies upon the diameter of the larger circle and touches the circumference. Position the smaller circle so its diameter runs along (coincides with) the diameter of the larger circle from the base of the triangle to the circumference of the large circle. Now add a third circle inscribed so that it touches the other two circles and the triangle. If you draw a line segment from the center of the third circle to the point where the second circle and the triangle meet, can you prove that the line segment is perpendicular to the diameter of the large circle?



DEC/JAN 3. Our final regular problem is from Ludwig Chincarini, who notes that Parkinson’s disease affects .3 percent of the population. A new test is able to detect if young individuals are predisposed to the disease. It has false-positive and false-negative rates of 7 percent. That is, the test is positive for 7 percent of the people who will not develop the disease and negative for 7 percent of the people who will. If an individual tests positive, what are the chances s/he will develop the disease?

Speed Department

Ray Ellis went to an annular racetrack and drew a chord of the outer circle that was tangent to the inner circle. The chord was 200 feet long. What is the area of the racetrack?

Solutions

JUL 1. Larry Kells offers a problem attributed to Moses Ma that “trumps” previous problems of ours in the same genre.

“My friend recently told me that he and his wife were playing a Swiss team and bid and made four spades redoubled. At the other table, their teammates (playing the opposite cards) bid four spades redoubled–and made five! There was nothing to fault about the opponents’ defensive play. You once showed a deal where the defenders against four spades take 10 tricks on one side and 11 on the other. But they have the advantage of the opening lead. Also, you published a solution where both sides can make three spades doubled. But on this deal, both sides made four spades redoubled, one with an overtrick! Anybody care to try it?”

Apparently this problem was quite a bit harder than its predecessors. Although I am not a bridge expert, I do realize the possibility of a small change in the problem statement (initial conditions) leading to a large change in the final result. The following solution is from Larry Kells:

West	North	East
	North	
	♠ 7654	
	♥ AKQJT43	
	♦ 32	
West	♣	**East**
♠		♠ AKQ32
♥ 2		♥ 98765
♦		♦ KJ
♣ AKQJT987 6543	**South**	♣ 2
	♠ JT98	
	♥	
	♦ AQT987654	
	♣	

When South is declarer: If West leads a club, ruff in dummy and discard a diamond. Then cash five hearts, throwing diamonds. Take the diamond finesse and cash the second diamond winner, then ruff your last diamond. You still have all your trumps, so East gets only his three high trumps. If West leads his heart, cash the five hearts throwing diamonds, take the diamond finesse and cash the second winner, then ruff your eighth diamond.

If East overruffs and leads three more trumps, South's hand is good. If East exits with a small trump without cashing all his high ones, South can ruff his last diamond in dummy. If East exits with a club, South ruffs in dummy while discarding his last diamond. Finally, if East doesn't overruff the eighth diamond, South leads a heart off dummy. If East ruffs high or discards, South discards his last diamond. If East ruffs low, South overruffs and ruffs his last diamond in dummy. In all cases East gets only his three high trumps. Making four spades.

When East is declarer, he should just lead four rounds of spades as early as possible. South gets one spade and the ace of diamonds; that's all. Making five spades!

JUL 2. Avi Ornstein has circumscribed a triangle around a radius 1 circle. What is the minimum area Avi's triangle can have?

Oops. I mistakenly omitted the requirement that the triangle have a right angle. The resulting minimum is achieved by an equilateral triangle, as shown by Ken Zegler's solution, printed below. Two rather different solutions from Henri Hodara can be found at cs.nyu .edu/~gottlieb/tr. Ornstein, who pointed out my error, has reworded his original problem. This revision will appear in a future "Puzzle Corner," most likely next year.

Let T be the circumscribing triangle and let x, y, z be the differences from T's vertices to the circle's tangency points. Connect the center of the circle to T's vertices. Since the distance from the center of the circle to each of T's sides is 1, the area of T is

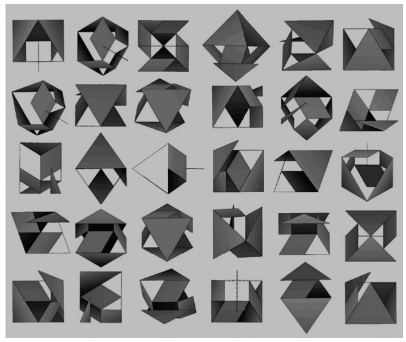
$$\frac{x+y}{2} + \frac{y+z}{2} + \frac{z+x}{2} = x+y+z$$

On the other hand, denoting T's semiperimeter by $s = x + y + z$, Heron's formula gives the area of T as

$$\sqrt{s(s-(y+z))(s-(z+x))(s-(x+y))} = \sqrt{(x+y+z)\,xyz}$$

Equating the two area formulas then gives $x + y + z = xyz$. The arithmetic-geometric mean inequality implies $(xyz)^{1/3} \leq (x+y+z)/3 = xyz/3$, so T's area is lower bounded as $xyz \geq 3\sqrt{3}$, and this lower bound is attained when $x = y = z$.

JUL 3. Samuel Verbiese wants to know what this series of pictures suggests to you.



There were no responses. The proposer has referred to the figure as a tangramoid. Although Google finds no hits for this name, perhaps it will serve as a hint for some reader.

Better Late than Never

1980 AUG/SEP 3. Fred Tydeman has pushed the envelope on this old (yes, 1980!) problem. Please browse cs.nyu .edu/~gottlieb/tr to see his contribution.

2004 DEC 2. Steve Jones has found a way to cut the 7 into just seven pieces that can be reassembled into a square.

Other Responders

Replies have also come from R. Giovanniello, H. Ingraham, J. Licini, R. Nevins, K. Rosato, E. Sard, C. Willy, and K. Zeger.

Proposer's Solution to the Speed Problem

Since the problem is solvable, the solution is independent of the size of the inner circle. Hence we can consider the case where the hole or infield has diameter zero. Then the area is simply the area of a circle with diameter 200 feet, which is $10,000\pi$ square feet.

Send problems, solutions, and comments to Allan Gottlieb, New York University, 715 Broadway, Room 712, New York NY 10003, or to gottlieb@nyu.edu.