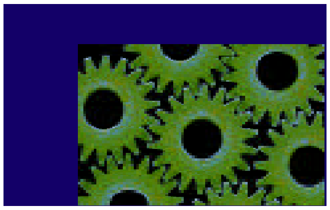

Brain Ticklers Celebrates 50th Year!

FIFTIETH ANNIVERSARY

The first Brain Tickler in THE BENT appeared in April 1951. We continue our observance of this 50^{th} anniversary year by repeating problems that were used in 1951. The repeat problem for this column is the find-the-midpoint Double Bonus problem.

We have also been providing statistics for each decade of Brain Ticklers. For the period, 1981-90, we had 2,352 entries as compared to 1,838 from the prior 10-year period. The most *perfect* solutions to the regular problems were submitted by Kevin M.T. Stewart, NJ Δ '77; Don A. Dechman, TX Α '57; and Howard L. Benford, MI Γ '64. And the most correct *bonus* solutions were submitted by Don A. Dechman, TX Α '57; Kevin M.T. Stewart, NJ Δ '77; Howard L. Benford, MI Γ '64; and Stanley W. Shepperd, MA Β '70. There were no repeats from previous 10-year periods.

SUMMER REVIEW

Problem 5, concerning the 2 x 3 pane of postage stamps, was the most difficult of the Summer set. Only 30% of the entries had the correct configuration.

FALL ANSWERS

Here are the solutions to the Fall Brain Ticklers. Fall entries will be acknowledged in the next issue.

1. It had been snowing $(\sqrt{5} - 1)/2$ hours or about 37.08 minutes before the plow started. Since the rate of snowfall is constant and the rate of snow removal is also constant, the plow slows in inverse proportion to the depth of the snow, that is, in inverse proportion to the time elapsed since the snow began falling. The plow's velocity is $ds/dt = K/t$ or $ds = (K/t)dt$. Let t_0 be the time elapsed before the crew started. The integral of $(K/t)dt$ from t_0 to $t_0 + 1$ equals 2 miles, and the integral from $t_0 + 1$ to $t_0 + 2$ equals 1 mile. Then $K[\ln(t_0 + 1) - \ln(t_0)] = 2$, and $K[\ln(t_0 + 2) - \ln(t_0 + 1)] = 1$, which can be combined to eliminate K and simplified to $\ln[(t_0 + 1)/(t_0)] = 2\ln[(t_0 + 2)/(t_0 + 1)]$, which simplifies to $(t_0 + 1)^3 = t_0 (t_0 + 2)^2$ and $t_0^2 + t_0 - 1 = 0$, for which $t_0 = (\sqrt{5} - 1)/2$ is a solution.

2. The marriage pairings are A-C, D-E, G-P, and J-R. If George were incorrect, J married C, but the other conditions can not be met with any of John, Arthur, or David predicting correctly. So George must have been the one to predict correctly. Therefore, J did not marry C, A did not marry P, D married E, and G married P. Thus, A must have married C, and J must have married R.

3. ADAM + AND + EVE + ON + A = RAFT with ADAM and EVE as close as possible is 1015 + 130 + 979 + 43 + 1 = 2168. For ADAM and EVE to be as close as possible, try A equal to 1 and E equal to 9. Then R = 2 and D = 0 with 1 carried over from the ten's column to the hundred's column. There are 12 possible combinations of M,N,T but only (3,5,8), (5,3,8), (7,6,3), and (8,6,4) yield solutions for V,O,F with two solutions each for a total of eight solutions. Of these, the solution shown above has the closest ADAM and EVE. Incidentally, "Adam and Eve on a raft" is diner slang for two poached eggs on toast.

4. George was born on January 1, 1924. George is at least 26 to have gone swimming in 1947. In order for George to know the age of the boy, the two children must have the same prime number age. The children's age must be seven for George to be between 26 and 100 years old. So George is 49, and he must have been born on January 1 to be certain of the year he shot out the window. Thus, George was born on January 1, 1924, and he shot out the window in 1931.

5. The sum of the angles is 360 degrees. Let each edge of the pentagon be the base of a triangle, with the other two sides of each triangle being segments of the points of the star. Label the angles of each triangle A_i, B_i, and T_i, with T_i being the angle opposite the base of the triangle.

Then, $\Sigma(A_i + B_i)$ for $i = 1$ to 5 is the sum we are seeking. $\Sigma(A_i + B_i + T_i)$ for the five triangles is 5(180) = 900 degrees. Each T_i is equal to an interior angle of the small pentagon at the center of the star, and thus the sum of the five T_i's is 540 degrees. Thus, the answer we seek is 900 – 540 = 360 degrees.

Bonus. The sum of the series will approach 1.5 as the process is repeated infinitely. The sum of the original series is 2, and since each added term is half the sum of two adjacent terms, the sum of the added terms is 2 minus half the first term, or 2 – 1/2. Then, after dividing by 2, the new sum is 2 – 1/4, with the new first term being 1/2. Similar analysis shows that after the next repeat, the sum is 2 – 1/4 – 1/8, with the first term being 1/4. The sum after the next repeat is 2 – 1/4 – 1/8 – 1/16. So, the series approaches 2 – 1/2 or 1.5 as the process is infinitely repeated.

Double Bonus. Here is the decoding:

1 = Wheel on a Unicycle
2 = Sides to an Issue
3 = Blind Mice (See How They Run)
4 = Quarts in a Gallon
5 = Digits in a Zip Code
6 = Sides on a Cube
7 = Wonders of the Ancient World
8 = Sides on a Stop Sign
9 = Planets in the Solar System
10 = Decimal Digits
11 = Players on a Football Team
12 = Signs of the Zodiac
13 = Stripes on the American Flag
18 = Holes on a Golf Course
24 = Hours in a Day
26 = Letters of the Alphabet
29 = Days in February in a Leap Year
32 = Degrees Fahrenheit at which Water Freezes
40 = Days & Nights of the Great Flood
54 = Cards in a Deck (with the Jokers)
57 = Heinz Varieties
64 = Squares on a Chessboard
88 = Keys on a Piano
90 = Degrees in a Right Angle
200 = Dollars for Passing Go in Monopoly
1,000 = Words that a Picture is Worth
1,001 = Arabian Nights

NEW WINTER PROBLEMS

1. Two dice, one red and one white, are thrown. The number shown on the red die is divided by the number shown on the white die. What is the expected value of this quotient?

—William A. Whitworth, 1901

2. Two painters accept a job painting a room. Al can do the flat work in two hours and the trim work in one hour. Ben can do the flat work in three hours and the trim work in two hours. What is the minimum time, in minutes, that the two painters can paint the room if they divide the work in the optimum manner?

—**William S. Alderson,** *MI* E '43

3. Walking near a pond, a 45 kg boy finds a hemispherical concrete shell 2.5 cm thick and tries to use it as a boat. With the boy aboard and crouching low for stability, the shell floats with 10 cm of freeboard. If the specific gravity of the concrete is 2.5, what is the outside diameter of the hemisphere?

—**Craig K. Galer,** *MI* A '77

4. In how many different ways can eight queens be placed on a chess board such that no queen threatens another queen and no queen occupies a square that is on either major diagonal? A solution is considered different if it is not a rotation or reflection of another solution.

—**David H. Westwood,** *MN* A '43

5. During a recent game of five-card-draw poker, played with a standard deck of cards, I was dealt a hand with the following characteristics. It contained no aces or face cards and had no two cards of the same value. All four suits were present. The total value of the odd cards equaled the total value of the even cards. There were no three-card straights. The total value of the black cards was 10, and the total value of the hearts was 14. And the card with the lowest value was a spade. Precisely what were the five cards?

—*nearly impossible Brain Bafflers* by Tim Sole and Rod Marshall

Bonus. Ann and Bev play a game of random tic-tac-toe. They start with a tic-tac-toe grid with the boxes labeled 1 through 9. Next, they shuffle a deck of cards consisting of the ace, 2, 3, 4, 5, 6, 7, 8, and 9 of spades. They then take turns drawing cards, without replacement, and placing their initials in the squares corresponding to the card drawn until a winner is determined. If Ann draws first, what is her probability of winning, ignoring games that end in a draw?

—*The Surprise Attack in Mathematical Problems* by L. A. Graham

Double Bonus. Using only a pair of compasses, locate the midpoint between two given points, using fewer than 10 compass operations.

—**Elvin Greene,** *NJ* Γ '52

The judges are:
H. G. McIlvried III, *PA* Γ '53,
R. W. Rowland, *MD* B '51,
F. J. Tydeman, *CA* Δ '73, and the columnist for this issue,

—**Don A. Dechman,** *TX* A '57