Democratic Watchman.

Bellefonte, Pa., December 7, 1906.

PUZZLES IN FIGURES

MANY UNSOLVED MYSTERIES IN THE WORLD OF NUMBERS.

Little Things the Conditions of Which a Child Can Understand, Though the Greatest Minds Cannot Master Magic Squares.

Probing into the secrets of nature is a passion with all men, only we select different lines of research. Men have spent long lives in such attempts as to turn the baser metals into gold, to discover perpetual motion, to find a cure for certain malignant diseases, to navigate the air. Some great mysteries have after centuries of patient labor been completely solved, others are at present under investigation, while many have been demonstrated to be quite impossible of solution.

Let us examine a few cases of unsolved mysteries in the world of numbers—little things the conditions of which a child can understand, though the greatest minds cannot master. Everybody has heard the remark, "It is as hard as squaring the circle," though many people have a very hazy notion of what it means. It is this: If you have a circular piece of paper, how are you to cut out another piece in the form of a square that shall contain exactly the same area? Well, it cannot be done with exactitude, though we can get an answer near enough for all practical purposes, because it is not possible to say in exact numbers what is the proportion of the diameter to the circumference. But it is only in recent times that it has been proved to be impossible. Only cranks now waste their time in trying to solve this venerable puzzle.

Again, we can never measure exactly in numbers the diagonal of a square. If you have a window pane exactly a foot on each side, there is the distance from corner to corner staring you in the face, yet you can never say in exact numbers what is the length of that diagonal. The novice will at once suggest that we might take our diagonal first, say an exact foot, and then construct our square. Yes, you can do this, but then you can never say exactly what is the length of the side. You can have it which way you like, but you cannot have it both ways.

But let us take a few puzzles that have not been proved to be impossible, but which nevertheless have not been solved. They will give the reader some fascinating employment during spare hours, if he happens to be fond of figuring. First, then, take the round table problem. Nine persons are stopping at a boarding house, and they all sit down together to dinner on twenty-eight successive nights at a round table. The rule of the house is that no person shall on any two occasions have the two same neighbors. How is it to be done, if at all?

Here is another poser. If we write down the number, composed of seventeen ones—11,111,111,111,111,111—and ask you to find some number—other than 1 or the number itself—that will divide it without remainder, the answer will give you considerable labor to discover. We will, however, say at once that the only numbers that will divide it are 2,071,723 and 5,363,222,357. Now add two more ones to the number, and we cannot tell you whether it can be exactly divided by any number or not, for nobody knows. If you can find such a divisor you will have done something that nobody else in the world has yet succeeded in doing. And we cannot say that it is impossible.

Every one knows what a magic square is. Divide a square into nine divisions, or cells, and then place the numbers 1 to 9, one number in each cell, so that they shall add up fifteen in every column, every row and in each of the two diagonals. It is quite easy, and there is only one way of doing it, because we do not count as different the arrangements obtained by merely turning around the square and reflecting it in a mirror.

Now, if we wish to make a magic square of the sixteen numbers, 1 to 16, there are just 880 different ways of doing it, again not counting reversals and reflections. This has been finally proved of recent years. But how many magic squares can be formed with the twenty-five numbers, 1 to 25, nobody knows, and we shall have to extend our knowledge in certain directions before we can hope to solve this puzzle. But it is startling to find that exactly 174,240 such squares may be formed of one particular kind only—the bordered square, in which the inner square of nine cells is in itself magic. And the present writer has shown how this number may at once be doubled by merely converting every bordered square by a simple rule into a non-bordered one.

Vain attempts have been made to construct a magic square by what is called a "knight's tour" over the chess board, numbering each square that the knight visits in succession, 1, 2, 3, 4, etc., and it has been done with the exception of the two diagonals, which so far have baffled all efforts. But it is not certain that it cannot be done.

Here is one more unsolved problem in numbers: We all know that a square number is a number multiplied by itself, but a cube number is one multiplied twice by itself—thus, 8 is the cube of 2, 27 the cube of 3, and so on. Now, some whole numbers are the sum of two whole cubes—as 35 is the sum of the cubes of 2 and 3—others are the sum of two fractional cubes—as 43 is the sum of the cubes of ½ and 7-2—while the whole numbers cannot be expressed as the sum of two cubes in any way whatever. It is possible to say of any number from 1 to 100 whether it is or is not the sum of two cubes, except 66. Nobody in the world can answer for this number. Can you solve these problems?—London Answers.

The Earth's Insides.

Is the earth made up of three concentric spheres? A physician says that such is the case. The solid nucleus he supposes to be between 3,000 and 7,000 miles in diameter, and this is surrounded by a liquid substratum, outside of which is the crust, variously estimated at 70 to 200 miles in thickness. More than two centuries ago a similar theory, including the slow rotation of the inner solid sphere on a different axis from that of the entire globe, was held by Dr. Edmund Halley to account for the changes in the earth's magnetism. The axis of the nucleus was thought to have been originally that of the entire globe, and to the change of its course was attributed the deluge. The earth's internal heat, it is now pointed out, may be accounted for by the friction of the different rotating bodies.

Bad Importations.

Englishmen introduced the rabbit to Australia, where it ruined vast areas of valuable land. Weasels sent to correct the mistake found ground birds good eating and let the rabbits alone. Scotsmen bestowed the thistle upon New Zealand and then wished they hadn't. A pretty water weed of which Englishmen are fond was transplanted to New Zealand and throve so that it dams broad rivers. The mongoose sent to Jamaica to kill off the cane rats exterminated them and developed a fine liking for poultry.

"It Suits to a T."

The clause, "It suits to a T," meaning it fits exactly, is as old as the familiar instrument, the T square or T rule (so called from its resemblance to the letter T), used by mechanics and draftsmen for making angles true and for obtaining perpendiculars. The expression was in common use in the time of Dr. Johnson, who is quoted by Boswell as saying of Wharburton, "You see they'd have fitted him to a T."

The Changing Frenchman.

There was a time when having to cross the frontiers of his native land was regarded by a Frenchman as the greatest hardship he could undergo. Today he is the rival of the Anglo-Saxon where love of travel and adventure are concerned.—Paris Figaro.

Thackeray's Apology.

Thackeray once wrote in a note to a friend, alluding to an incident occasioned by one of his articles in Punch: "I thought over the confounded matter in the railroad and wrote instantly on arriving here a letter of contrition and apology to Henry Taylor for having made what I see now was a flippant and offensive allusion to Mrs. Taylor. I am glad I have done it. I am glad that so many people whom I have been thinking bigoted and unfair and unjust toward me have been right and that I have been wrong, and my mind is an immense deal easier."

A Great Idea.

"My new play is sure to make a hit," said the great actress. "It gives me an opportunity to display twenty new gowns."

"Gracious!" exclaimed her friend. "How many acts?"

"Only four, but in one of them the scene's at a dressmaker's."—Philadelphia Press.

WAYS OF THE TOAD.

Some of the Oddities of This Peculiar Creature.

It is remarkable that the toad, loving water as it does, should wander away from watery regions to dry ground, where it can never see a drop of water except at rain time and leave its water rights to the undisputed possession of its ranal neighbor the frog. How the toad loves water must be known to every garden lover. Whenever there is a shower the creature leaves its cool retreat under the piazza or shed and stands as far as its fore legs will let it, erect in the rain, apparently enjoying to the utmost the shower bath.

Whenever they are near the water at breeding time they deposit long, slimy strings of eggs, and the young toad has to go through the tadpole stage in common with his brother frog. But when they are wholly excluded by distance from the water they seem to have the power of being viviparous, or bringing forth their young alive. In the water fertilization is effected in the same manner as in fishes, but the method in the land life career is not known. About all that is known is that confined toads are found with little toads, no larger than house flies, about them after a time, and in walled gardens and places far removed from water little toads, no larger than peas, wandering around on their own resources and which could never have been tadpoles, are within common experience.

MARY CAMPBELL.

The Lassie Who Was the Original of "Highland Mary."

The original of "Highland Mary" was Mary Campbell, a highland lassie who was a servant at Castle Montgomery, with whom Burns became acquainted during his residence at Mossgiel. To her he addressed the lines, "Will ye go to the Indies, my Mary?" and many others. In a note to one of his poems on Mary, Burns says: "After a pretty long time of the most ardent reciprocal feeling we met by appointment on the second Sunday of May, in a sequestered spot by the banks of the Ayr, where we spent a day in taking a farewell before she should embark for the west highlands to arrange matters among her friends for our projected change of life. At the close of the autumn following she crossed the sea to meet me at Greenock, where she had scarce landed when she was seized with a malignant fever, which hurried my dear girl to her grave before I could even hear of her illness." The love which Burns felt for Mary Campbell appears to have been deeper than any he ever felt before or after. Years later, when he was married and had a family, her memory inspired the pathetic lines "To Mary In Heaven," which breathe the soul of tender melancholy.—London Tit-Bits.

Slogg Knew Why.

Schoolmaster—"Now, Sloggs, you clearly understand the reason why I'm going to cane you, don't you?"

Sloggs (son of the middle-weight champion)—"Yes, sir. It's because you're a heavy-weight and I'm only a bantam."

Busy Grass Widow.

"Pop."

"Yes, my son."

"What is a grass widow?"

"A grass widow, my son, is one who makes hay while the sun shines."

Travelers Guide.

CENTRAL RAILROAD OF PENNA.

Condensed Time Table effective Dec. 3, 1906

Read down No 1	No 5	No 3	Stations	Read up No 6	No 4	No 2
a. m.	p. m.	p. m.	Lve. Ar.	p. m.	p. m.	a. m.
†7 10	†6 40	†2 45	BELLEFONTE.	9 10	5 15	9 40
7 21	6 51	2 56	.....Nigh.....	8 57	5 02	9 27
7 26	†6 56	3 01	.....Zion.....	†8 51	4 57	9 21
7 33	7 03	3 08	..HECLA PARK..	8 45	4 51	9 15
7 35		3 10	..... Dunkles.....	8 43	4 48	9 13
7 39	†7 08	3 14	...Hublersburg...	†8 39	4 44	9 09
7 43	7 13	3 18	...Snydertown....	8 36	4 40	9 05
7 45	†7 15	3 20	.....Nittany.....	†8 34	4 38	9 02
7 47	†7 18	3 22	.....Huston	†8 32	4 35	9 00
7 51	7 23	3 26	.....Lamar.....	†8 29	4 32	8 57
7 53	†7 25	3 28	.....Clintondale....	†8 26	4 29	8 54
7 57	7 29	3 32	..Krider's Siding.	8 22	4 25	8 51
8 01	7 34	3 36	...Mackeyville....	†8 18	4 20	8 46
8 07	7 39	3 42	...Cedar Spring...	8 12	4 14	8 40
8 10	7 42	3 45	.....Salona.....	8 10	4 12	8 38
8 15	7 47	3 50	...MILL HALL....	8 05	†4 07	†8 33

(N. Y. Central & Hudson River R. R.)

11 45	8 35		.....Jersey Shore.....	3 26	7 52
12 20	9 10	Arr.	WMs'PORT	Lve	2 50	†7 20
†12 29	11 30	Lve	WMs'PORT	Arr.	2 30	6 50
			(Phila. & Reading Ry.)		
¶ 30	6 50		.....PHILA.....	†8 26	11 30
10 10	8 55		.....NEW YORK.....		9 00
			(Via Phila.)		
p. m.	a. m.	Arr.	Lve.	a. m.	p. m.
			†Week Days		
		Ar	...NEW YORK... Lv		
			(Via Tamaqua)		

WALLACE H. GEPHART,
General Superintendent.

BELLEFONTE CENTRAL RAILROAD.

Schedule to take effect Monday, May 29, 1905.

Westward read down †No. 5	†No. 3	No. 1	Stations.	Eastward read up †No. 2	†No. 4	No. 6
P. M.	A. M.	A.M.	Lv Ar.	A. M.	P. M.	P.M.
3 00	10 15	6 30	...Bellefonte....	8 50	12 50	6 30
3 07	10 20	6 35	.....Coleville.....	8 40	12 40	6 10
3 12	10 23	6 38	.....Morris.....	8 37	12 37	6 07
3 17	10 27	6 43	.....Stevens.....	° 35	12 35	6 03
			...Lime Centre...			
3 21	10 30	6 46	.Hunter's Park.	8 31		
3 26	10 34	6 50	.....Fillmore.....	8 28	12 28	5 55
3 32	10 40	6 55	.....Briarly.....	8 24	12 24	5 50
3 35	10 45	7 00	.....Waddles.....	8 20	12 20	5 45
3 50	10 57	7 12	....Krumrine....	8 07	12 07	5 27
4 05	11 10	7 25	..State College..	8 00	12 00	5 20
4 13		7 27	.....Struble.....	° 45		4 30
4 15		7 31	...Bloomsdale....	7 40		4 25
4 20		7 35	Pine Grove M'ls	7 35		4 20

F. H. THOMAS, Supt.