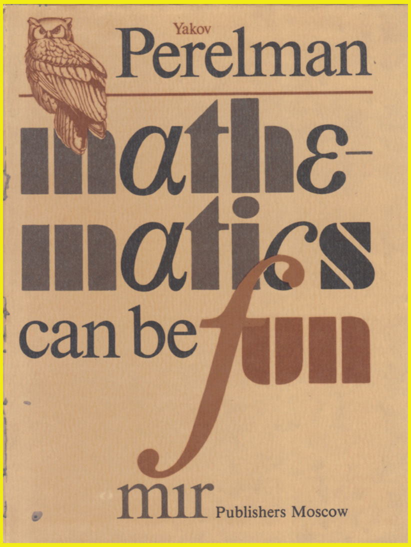

Continued....

Part by part of this book will be published in the Vidurava issues for the benefit of the readers.

In June 2014 issue we published Questions 1 - 8 of the above publication. In this issue, you can read Questions 9- 13.

9. Matches

The man emptied a box of matches on the table and divided them into three heaps.
"You aren't going to start a bonfire, are you?" someone quipped.
"No, they're for my brain-teaser. Here you are-three uneven heaps. There are altogether 48 matches. I won't tell how many there are in each heap. Look well. If I take as many matches from the first heap as there are in the second and add them to the second, and then take as many from the second as there are in the third and add them to the third, and finally take as many from the third as there are in the first and add them to the first-well, if I do all this, the heaps will all have the same number of matches. How many were there originally in each heap?"

10.The "Wonderful" Stump

"My puzzle is the one I was once asked by a village mathematician to solve," the next person began. "It was really a story, and quite humorous at that. One day, a peasant met an old man in a forest. The two fell into a conversation. The old man looked at the peasant attentively and said:
"There's a wonderful little stump in this forest. It helps people in need.'
"Does it? What does it do, cure people?'
"Not exactly. It doubles one's money. Put your pouch among the roots of the stump, count one hundred and-presto!-the money's doubled. It's a wonderful stump, that!'
"Can I try it?' the peasant asked excitedly.
"Why not? Only you must pay.'
"Pay whom and how much?'
"The man who shows you the stump. That's me. As to how much, that's another matter.'
"The two men began to bargain. When the old man learned that the peasant did not have much money, he agreed to take I ruble 20 kopecks every time the money doubled.
"The two went deep into the forest where, after a long search, the old man brought the peasant to a moss-covered fir stump in bushes. He then took the peasant's pouch and shoved it among the roots. After that they counted one hundred. The old man took a long time to find the pouch and returned it to the peasant.
"The latter opened the pouch and, lo! The money really had doubled! He counted off the ruble and 20 kopecks, as agreed upon, and asked the old man to repeat the whole thing.
"Once again they counted one hundred, once again the old man began his search for the pouch and once again there wa a miracle-the money had doubled again. And just as they had agreed, the old man got his ruble and 20 kopecks.
"Then they hid the pouch for the third time and this time too the money doubled. But after the peasant had paid the old man his ruble and 20 kopecks, there was nothing left in the pouch. The poor fellow had lost all his money in this process. There was no more money to be doubled and he walked off crest-fallen.
"The secret, of course, is clear to all-it was not for nothing that the old man took so long to find the pouch. But there is another question I would like to ask you: how much did the peasant have originally?"

11. The December Puzzle

"Well, comrades," began the next man. "I'm a linguist, not a mathematician, so you needn't expect a mathematical problem. I'll ask you one of another kind, one close to my sphere of activities. It's about the calendar." "Go ahead."
"December is the twelfth month of the year. Do you know what the name really means? The word comes from the Greek 'deka'-ten. Hence, decalitre which means ten litres, decade-ten days, etc. December, to all appearances, should be the tenth month and yet it isn't. How d'you explain that?"

12. An Arithmetical Trick

"I'll give you an arithmetical trick and ask you to explain it. One of you-you, professor, if you like-write down a three-digit number, but don't tell me what it is."
"Can we have any noughts in it?"
"I set no reservations. You can write down any three numerals you want."
"All right, I've done it. What next?"
"Write the same number alongside. Now you have a six-digit number."
"Right."
"Pass the slip to your neighbor, the one farther away from me, and let him divide this six-digit number by seven."
"It's easy for you to say that, and what if it can't be done?"
"Don't worry, it can."
"How can you be so sure when you haven't seen the number?"
"We'll talk after you've divided it."
"You're right. It does divide."
"Now pass the result to your neighbor, but don't tell me what it is. Let him divide it by 11."
"Think you'll have your own way again?"
"Go ahead, divide it. There'll be no remainder."
"You're right again. Now what?"
"Pass the result on and let the next man divide it, say, by 13."
"That's a bad choice. There are very few numbers that are divisible by 13. You're certainly lucky, this one is!"
"Now give me the slip, but fold it so that I don't see the number."
Without unfolding the slip, the man passed it on to the professor.
"Here's your number. Correct?"
"Absolutely." The professor was surprised. " That is the number I wrote down…. Well, everyone has had his turn, the rain has stopped, so let's go out. We'll know the answers tonight. You may give me all the slips then."

Answer 9 - 12

9. This problem is solved from the end. Let us proceed from the fact that, after all the transpositions, the number of matches in each heap is the same. Since the total number of matches (48) has not changed in the process, it follows that there were 16 in each heap.
And so, what we have in the end is:

First Heap	Second Heap	Third Heap
16	16	16

Immediately before that we had added to the first heap as many matches as there were in it, i.e. we had doubled the number. Thus, before that final transposotion, there were only 8 matches in the first heap In the third heap, from which we took these 8 matches, there were:
16+8=24
Now we have the following numbers:

First Heap	Second Heap	Third Heap
08	16	24

Further, we know that from the second heap we took as many matches as there were in the third heap.
That means 24 was double the original number. This shows us how many matches we had in each heap after the first transposition:

First Heap	Second Heap	Third Heap
08	16+12=28	12

It is clear now that before the first transposition (i.e. Before we took as many matches from the first heap as there were in the second and added them to the second) the number of matches in each heap was:

First Heap	Second Heap	Third Heap
22	14	12

10. This riddle, too, can best be solved in reverse. We know that when the money was doubled for the third time, there was I ruble 20 kopecks in the pouch (that is the sum the old man received the last time). How much was there in the pouch before that? The peasant had paid the old man his second ruble and 20 kopecks. Therefore, before the payment there was:
1.20+0.60=1.80
Further: 1 ruble 80 kopecks was the sum after the money had been doubled for the second time. Before that there were only 90 kopecks, i.e. What remained after the peasant had paid the old man his first ruble and 20 kopecks. Hence, before the first payment there were 0.90+1.20=2.10 in the pouch. That was after the first operation. Originally, therefore, there was half that amount, or 1 ruble 5 kopecks. That was the sum with which the peasant had started his unsuccessful get-rich-quick operation.
Let us verify:

Money in the pouch:

After the first operation....
1.05 x 2 = 2.10

After the first payment....
2.10 - 1.20 = 0.90

After the second operation....
0.90 x 2 = 1.80
After the second payment....
1.80 - 1.20 = 0.60

After the third operation....
0.60 x 2 = 1.20

After the third payment....
1.20 - 1.20 = 0

11. Our calender comes from the early Romans who, before Julius Caesar, began the year in March. December was then the tenth month. When New Year was moved to January 1, the names of the months were not shifted. Hence the names of certain months and their sequence:

Month	Meaning	Place
September	(septem-seven)	9th
October	(octo-eight)	10th
November	(novem-nine)	11th
December	(deka-ten)	12th

12. Let us see what happened to the original number. First, a similar number was written alongside it. That is as if we took a number, multiplied it by 1000 and then added the original number, e.g.:

872872 = 872000 + 872

It is clear that what we have really done was to multiply the original number by 1001.
What did we do after that? We divided it in turn by 7,11, and 13, or by 7x11x13, i.e. by 1001.

So, we first multiplied the original by 1001 and then divided it by 1001. Simple, isn't it?

Before we close our chapter about the brain-teasers at the holiday home, I should like to tell you of another three arithmetical tricks that you can try on your friends. In two you have to guess numbers and in the third, the owners of certain objects.

These tricks are very old and you probably know them well, but I am not sure that all people know what they are based on. And if you do not know the theoretic basis of tricks, you cannot expect to unravel them. The explanation of the first two will require an absolutely elementary knowledge of algebra.

13. The Missing Digit

Tell your friend to write any multi-digit number, say, 847. Ask him to add up these digits (8+4+7)+19 and then subtract the total from the original. The result will be:
847-19=828.

Ask him to cross out any one of the three digits and tell you the remaining ones. Then you tell him the digit he has crossed out, although you know neither the original nor what your friend has done with it.
How is this explained?

Very simply: all you have to do is to find the digit which, added to the two you know, will from the nearest number divisible by 9. For instance, if in the number 828 he crosses out the first digit (8) and tells you the other two (2 and 8), you add them and get 10. The nearest number divisible ny 9 is 18. The missing number is consequently 8.
How is that? No matter what the number is, if you subtract from it the total number of its digits, the balance will always be divisible by 9. Algebraically, we can take a for the number of hundreds, b for the number of tens and c for the number of units. The total number of units is therefore:
100a+10b+c.

From this number we subtract the sum total of its digits a+b+c and we obtain:
100a+10b+c –
(a+b+c)=99a+9b=9 (11a+b).
But 9(11a+b) is, of course, divisible by 9. Therefore, when we subtract from a number the sum total of its digits, the balance is always divisible by 9.

It may happen that the sum of the digits you are told is divisible by 9 (for example, 4 and 5). That shows that the digits your friend has crossed out is either 0 or 9, and in that case you have to say that the missing digit is either 0 or 9.

Here is another version of the same trick: instead of subtracting from the original number the sum total of its digits, ask your friend to subtract the same number only transposed in any way he wishes. For instance, if he writes 8247, he can subtract 2748 (if the number transposed is greater than the originals, subtract the original). The rest is done as described above: 8247-2748=5499. If the crossed-out digit is 4, then knowing the other three (5,9, and 9), you add them up and get 23. The nearest number divisible by 9 is 27. Therefore, the missing digit is 27-23=4.