

with thunder, 3rd, 9th. Lightning and thunder with rain, 1st (some trees blown down), 10th, 11th, 29th. Wind storm, 1st. Fog, 29th. Rain, 1st, 4th, 10th, 11th, 16th, 18th, 21st, 23rd, 25th, 26th, 29th, 30th. A faint rosy hue in the sky on 2nd, about 8.45 P. M. The observer continues his record of the blossoming of plants.

SIMCOE.—Lightning, 2nd, 12th. Lightning and thunder with rain, 9th. Wind storms, 1st, 10th, 12th, 30th. Rain, 2nd, 4th, 9th, 21st, 25th, 26th, 31st. Remarkably hot, dry month.

WINDSOR.—Lightning, 2nd, 11th, 12th, 15th. Thunder with rain, 12th, 29th, 31st. Lightning with thunder and rain, 11th. Meteors as follows: 1st, one through *Ursa Major*, towards N.; 5th, one through *Cassiopea*, to H.; 6th, two in N. toward S. W.; 13th, two through *Cassiopea*, towards E.; 24th, one through *Cygnus* to *Ursa Minor*; 28th, one in E. toward N. Rainbow, 3rd and 16th. Halo, 15th. Rain, 10th—12th, 16th, 17th, 23rd, 25th, 29th—31st.

IV. Mathematical and Science Department.

1. THE ROMANCE OF ARITHMETIC.

The most romantic of all numbers is figure nine, because it can't be multiplied away or got rid of anyhow. Whatever you do, it is as sure to turn up again as was the body of Eugene Aram's victim. One remarkable property of this figure (said to have been first discovered by W. Green, who died in 1794) is that all through the multiplication table the product of nine comes to nine. Multiply it by what you like, and it gives the same result. Begin with twice nine, 18; add the digits together, and 1 and 8 make nine. Three times nine are 27; and 2 and 7 make 9. So it goes on, up to 11 times 9, which gives 99. Very good; add the digits; 9 and 9 are 18, and 1 and 8 are nine. Going on to any extent, it is impossible to get rid of figure nine. Take a couple of instances at random. Three hundred and thirty-nine times nine are 3051; add up the figures and they give nine. Five thousand and seventy-one times nine are 45639; the sum of these digits is 27; and 2 and 7 are nine.

M. de Maivan found out another queer thing about this number, namely, that if you take any row of figures, and, reversing their order, make a subtraction sum of it, the total is sure to be nine.

For example:

Take 5071
Reverse the figures, 1705

$$3366=18, \text{ and } 1+8=9.$$

The same result is obtained if you raise the number so changed to their squares or cubes. Starting with 62, begin the sum over again. By reversing the digits, we get 26, which subtracted from 62, leaves 36, or $3+6=9$. The squares of 26 and 62 are, respectively, 676 and 3844. Subtract one from the other, and you get $3168=18$, and $1+8=9$. So with the cubes of 26 and 62, which are 17576 and 238328. Subtracted, they leave $220752=18$, and $1+8=9$.

The powerful be-nine influence of this figure is exemplified in another way. Write down any number, as for example, 7549132; subtract therefrom the sum of its digits, and no matter what figures you start with, the digits of the product will always come to 9.

$$7549132 = \text{sum of digits } 31.$$

$$7549101 = \text{sum of digits } 27, \text{ and } 2+7=9.$$

A very good puzzle has been based on this principle, as follows: Get another person to write down a horizontal row of figures, as many as he likes, without letting you see what he is about from beginning to end of the whole performance. He is then to reckon up the sum of the digits, and subtract that from his row of figures. When he has done this, bid him cross out any figure he pleases from the product, and tell you how many the figures add up, without the crossed-out figure. From the numbers so given you will be able to tell what figure he has crossed out, by only bearing in mind the fact learned above, namely, that if no figure at all had been crossed out, the result would necessarily be 9 or a multiple of 9. Hence you will see that the crossed out figure must needs be the one required to bring the sum given to the next multiple of 9. Supposing, for instance, he gives his result at 37; you may be sure that he has robbed the product of 8, that being the figure needed to restore the total to the next multiple of 9, namely, 45. His sum would stand as under:

$$405678237 = \text{sum of digits } 42.$$

$$405678195 = 45; \text{ and } 45-8=37.$$

There is only one case in which you can be at fault, and that is in the event of a multiple of 9 being returned to you as a pro-

duct. Of course then you will know that either a 9 or a 0 must have been struck out. Had the 9 been struck out in the above instance, the result would have been 36; and if it had been 0, the product would have been 45. Both being multiples of 9, it would be impossible to tell with certainty whether the missing figure were 9 or 0; but a good guess may generally be formed, because if the figures appear suspiciously low in proportion to the time taken to add up the sum, you may speculate that your product has most likely sustained the loss of the highest number.

There is a clever Persian story about Mahommed Ali and the Camels; and though it will be familiar to many of my readers, they will scarcely be sorry to be reminded of it. A Persian died, leaving seventeen camels to be divided among his three sons in the following proportions: the eldest to have half, the second a third, and the younger a ninth. Of course camels can't be divided into fractions; so in despair the brothers submitted the difficulty to Mahommed Ali. "Nothing easier," said the wise Ali. "I'll lend you another camel to make eighteen, and now divide them yourselves." The consequence was, each brother got from one-eighth to one-half of a camel more than he was entitled to, and Ali received his camel back again; the eldest brother getting nine camels, the second six, and the third two.

Johann August Musæus, one of the most popular German story writers of the last century, in his story of "Libussa," makes the Lady of Bohemia put forth the following problem to her three lovers, offering her hand and throne as a prize for the true solution: "I have here in my basket," said the Lady Libussa, "a gift of plums for each of you, picked from my garden. One of you shall have half and one more, the second shall have half and one more, and the third shall again have half and three more. This will empty my basket. Now tell me how many plums are in it?"

The first knight made a random guess at three score.

"No," replied the lady; "but if there were as many more, and a third as many more as there are in the basket, with five more added to that, the number would by so much exceed three score as it now falls short of it."

The second knight getting awfully bewildered, speculated wildly on forty-five.

"Not so," said this royal ready-reckoner; but if there were a third as many more, half as many more, and a sixth as many more as there are now, there would be in my basket as many more than forty-five as there are now under that number."

Prince Wladimir then decided the number of plums to be thirty, and by so doing obtained this invaluable housekeeper for his wife, The Lady Libussa thereupon counted him fifteen plums and one more, when there remained fourteen. To the second knight she gave seven and one more, and six remained. To the first knight she gave half of these and three more; and the basket was empty. The discarded lovers went off with their heads exceedingly giddy, and their mouths full of plums.

Double Position, or the Rule of False, by which problems of this sort are worked, ought to demolish the commonplace about two wrongs not making a right. Two wrongs do make a right, figuratively speaking, at all events. Starting with two wilfully false numbers, you work each out to its natural conclusion. Then, taking the sum of your iniquities as compared with the falsehoods with which you started, you have only to multiply them crosswise to get terms which will bring you straight to the truth. To be more precise, after the cross multiplication, if the errors are alike, that is, both greater or both less than the number you want, take their difference for a divisor, and the difference of the products are a dividend. If unlike, take their sum for a divisor, and the sum of their products for a dividend. The quotient will be the answer. This is good arithmetic, and for those who can receive it not bad philosophy. There is an enormous self-righting power about error; and if we could only manage the cross multiplication properly, we might get some surprising results.

The number thirty-seven has this strange peculiarity: multiplied by 3, or any multiple of 3 up to 27, it gives three figures all alike. Thus, three times 37 will be 111. Twice three times (6 times) 37 will be 222; three times three times (9 times) 37 will be three threes; four times three times (12 times) 37, three fours, and so on.

I will wind up the present with a rather barefaced story of how a Dublin chambermaid is said to have got twelve commercial travellers into eleven bedrooms, and yet to have given each a separate room. Here we have the eleven bedrooms:

1	2	3	4	5	6	7	8	9	10	11
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"Now," said she, "if two of you gentlemen will go into No. 1 bedroom, and wait for a few minutes, I'll find a spare room for one of you as soon as I've shown the others to their rooms."