CORRESPONDENCE

To the Editor of the *Mathematical Gazette.*

DEAR SIR,

Simple Subtraction.

I think the admirable report on Mathematics in Primary Schools might be improved by mentioning an explanation of subtraction which I learnt from a boy who was 6 years old.

In a sum such as

$$\begin{array}{r} 67 \\ -29 \\ \hline 38 \\ \hline \end{array}$$

using bundles of matches (tied in tens) he had been taught to borrow ten, so that he had 5 tens and 17 units. He then found the 8 and was taught to go on 2 from 5. I tried to persuade him to take 3 (i.e. $1+2$) from the 6. Suddenly he said " Oh! I see, you take away the 1 and the 2 *at the same time.*

Soon after Dr. Ballard's *Teaching the Essentials of Arithmetic* came out, I told him of the above. He wrote me a most enthusiastic letter, saying that it was the best explanation he had ever seen and he should always use it in future

Yours, etc., A. W. SIDDONS

To the Editor of the *Mathematical Gazette.*

Query.

DEAR SIR,—The alleged inequality

$$f(x_1, \dots, x_n) = \frac{x_1}{x_2+x_3} + \frac{x_2}{x_3+x_4} + \dots + \frac{x_{n-1}}{x_n+x_1} + \frac{x_n}{x_1+x_2} \geqslant \tfrac{1}{2}n,$$

where $x_r > 0$, $r = 1$ to n, given by H. S. Shapiro (*American Math. Monthly*, Oct. 1954) is true when $n=3$ and $n=4$.

The following example, due to Professor Lighthill, shows that it is not true in general :

When $n=20$, take $x_1, x_2, \dots, x_{20}$ to be (in that order) $1+5\epsilon$, 6ϵ, $1+4\epsilon$, 5ϵ, $1+3\epsilon$, 4ϵ, $1+2\epsilon$, 3ϵ, $1+\epsilon$, 2ϵ, $1+2\epsilon$, ϵ, $1+3\epsilon$, 2ϵ, $1+4\epsilon$, 3ϵ, $1+5\epsilon$, 4ϵ, $1+6\epsilon$, 5ϵ, where ϵ is small and positive ; then it is easy to see that

$$f(x_1, \dots, x_n) = 10 - \epsilon^2 + O(\epsilon^3).$$

Are there simple examples which show that the inequality is untrue (i) if n is odd, (ii) if $4 < n < 20$?

Are there values of n greater than 4 for which the inequality is true?

Yours etc., C. V. DURELL

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