them a subject to write on, and allow them a few days to prepare it at home. This, of course, is done on paper.

I have seen very good results follow these exercises, and have been highly gratified at the very successful attempts at composition of many of my pupils; also at the very creditable letters I have received from some who were quite young, but whose letters were far superior in execution to those of a majority of adults.

Yours most respectfully,
JAMES LAWSON,
Teacher.

Battersea, April 6th, 1872.

5. INTEREST THAT IS INTERESTING.

To the Editor of the Journal of Education.

SIR,—Mr. McLellan's note on one of the problems in the recent examination papers induces me to make a few remarks on a similar one which I have since noticed, on page 203 of Sangster's Algebra. Inferring from the answer, the text-book reasons that as \$1 is due the last day, \$2 the preceding one and so on, the whole principal is equal \$1 for (1+2+3 . . . . 60) days, or \$1 for 1830 days. Interest on \$1 for one day=$\$\frac{1}{6000}$ and for 1830 days= $\$\frac{1830}{6000}$; this divided by number of payments gives $\$\frac{61}{12000}$ ∴daily payment=$1+\frac{61}{1200}$=$\$1.00\frac{61}{120}$; or, in other words, it is assumed that \$1 plus interest on remaining debt is paid each day and that the sum of the payments divided by their number is the equated daily payment, $=\left\{2(1\frac{1}{6000})+(60-1)\times\frac{1}{6000}\right\}\frac{60}{2}\div 60$ $=\$1.00\frac{61}{120}$. This evidently is unfair to the payer as he loses interest by part of his payment being made in advance. The following seems a better solution. Let a=daily payment.

Then	1st day's interest	=	$\frac{1}{6000}(60)$
	2nd " "	=	$\frac{1}{6000}(60-a)$
	3rd " "	=	$\frac{1}{6000}(60-2a)$
	4th " "	=	$\frac{1}{6000}(60-3a)$ &c.

This being a series whose first term, common difference, and number of terms respectively are $\frac{60}{6000}$, $-\frac{a}{6000}$ and 60, we have

$$60a=60+\left\{2\left(\frac{60}{6000}\right)+59\times-\frac{a}{6000}\right\}\frac{60}{2} \text{ whence } a=\$1.00\frac{6100}{12059}$$

Solving the \$5000 farm problem by the text-book principle, we get the annual payment = \$1437·50, while by the latter method above it is $\$1422{\cdot}01\frac{18}{109}$, making, on the whole, a difference of very nearly \$62.

Taking compound interest which only is fair we reason thus. Let a=daily payment as before, and r=daily interest on \$1. Then first day's principal and interest=$60(1+r)$; deducting daily payment $60(1+r)-a$ is left; this at interest for the second day amounts to $\left\{60(1+r)-a\right\}(1+r)$

Similarly, third day's amount=$\left\{\left\{60(1+r)-a\right\}(1+r)-a\right\}(1+r)$

" fourth " $\left\{\left\{\left\{60(1+r)-a\right\}(1+r)-a\right\}(1+r)-a\right\}(1+r)$

Deducting a and removing brackets we find the principal at the end of the fourth day=$60(1+r)^4-a(1+r)^3-a(1+r)^2-a(1+r)-a$

In like manner, we find, at the end of the nth day the remaining principal=$60(1+r)^n-a(1+r)^{n-1}-a(1+r)^{n-2}$ . . . . . a

$$=60(1+r)^n-a\left\{(1+r)^{n-1}+(1+r)^{n-2}+(1+r)^{n-3} \;.\;.\;.\; 1\right\}$$

$=60(1+r)^n-a\left\{\frac{(1+r)^n-1}{r}\right\}$ But when the debt is paid, the above expression $=o$; therefore

$$60(1+r)^n=a\left\{\frac{(1+r)^n-1}{r}\right\}$$

whence $a=\frac{60r(1+r)^n}{(1+r)^n-1}=$, in the case before, to

$$\frac{60\times\frac{1}{6000}\times\left(\frac{6001}{6000}\right)^{60}}{\left(\frac{6001}{6000}\right)^{60}-1}=\frac{\$\cdot01\times1\cdot010138}{\cdot010138}$$

Applying this to the examination question, we get $a=$

$$\frac{5000\times\cdot06\times1.06^4}{1\cdot06^4-1}=\$1442{\cdot}98$$

The following somewhat similar question was discussed by the legal and commercial men of a town in Western Canada, but entirely failing to agree they submitted it to the writer for his decision. It arose from a protested case in money-lending.

A lends B \$1000 payable in ten annual instalments of \$160 each. What rate per cent. *simple interest* does B pay for his money?

A majority thought his rate to be $10\frac{10}{11}$ which is in accordance with the text-book principle, but from the following it will be seen that he paid the usurious per centage of $21\frac{3}{7}$

Interest for first year	=	$1000r$.
" for second "	=	$(1000-160r)$
" for third "	=	$(1000-2\times160)r$.
" for fourth "	=	$(1000-3\times160)r$ &c.

From this series we get the total interest \$600=$2800r$ where r= yearly interest on one dollar. Hence rate per cent.=$600\div28=21\frac{3}{7}$

I am pleased to note, for reasons too many to mention here, the prominence given to commercial arithmetic by the central committee of examiners.

I remain, Sir,
Your obedient servant,
JOHN CAMERON.

COLLEGIATE INSTITUTE,
Cobourg, March 25th, 1872.

"THE CARPENTER'S SQUARE."

The readers of the *Journal of Education* will remember this question in the January number;—it was to find what length cut off the longer side of a Carpenter's Square and as much added to the shorter side, so that the hypothenuse may be rational. Let x=the quantity.

Then $(2-x)^2+(1+x)^2=5-2x+2x^2$, this is rational when $x=2$, hence we put $x=2-z$, and $5-4+2z+2(4-4z+z^2)=9-6z+2z^2$, equate this with, $(3-pz)^2=9-6pz+p^2z^2$,

$$z=\frac{6p-6}{p^2-2}. \qquad x=\frac{2p^2+2-6p}{p^2-2}$$

Take p any convenient quantity that will make x positive, if $p=\frac{2}{5}$,

$$x=\frac{\frac{8}{25}+\frac{50}{25}-\frac{60}{25}}{\frac{4}{25}-\frac{50}{25}}=\frac{1}{23}\text{ of a foot.}$$

$(2-\frac{1}{23})^2+(1+\frac{1}{23})^2=\frac{2025}{529}+\frac{576}{529}=\frac{2601}{529}=(\frac{51}{23})^2$, the hypothenuse would be $2\frac{5}{23}$ feet.

The following question I published in some of the local papers, but no one has offered a solution: An Indian Reserve is bounded by four straight lines, 1, 2, 3, 4 miles; required its maximum area in square miles?

JOHN IRELAND.

6. VALUE OF PUBLIC SPEAKING.

BY HENRY WARD BEECHER.

Some one writes to us that he is studying at a law school; that, besides knowledge of law, he is desirous of attaining the art of oratory, and he asks that we will give him such advice as our experience may suggest.

We can hardly hope to be of much service to the enquirer. We do not know his temperament, his disposition, his attainments, his habits, all of which would modify any instructions likely to be of benefit. It is personal that peculiar advice that each man needs, and that must be given by some one who knows the circumstances of the applicant.

Some general hints, applicable to all young aspirants for public speaking, may answer a good end.

1. The earlier one begins to practise public speaking the better. For although the gift, in point of fact, develops late in life, it is only in the case of those who have a strong, though, it may be, dormant talent for it. No man has learned any art until he can practise it spontaneously, without conscious volition. If this proves true in music, in drawing, in the dance, or graceful posturing, it is even more apparent in oratory. Parents and teachers should encourage children to narrate, to converse—for story-telling and fluent conversation are essentially of the same nature as oratory.

2. The habit of *thinking on one's feet* is invaluable. Great orations may be prepared with elaboration and study, not alone in their substance, but in form. Such we know to have been the preparation of orations which continue to be read from age to age

But for the purposes of American life, one must be qualified to speak well without laborious preparation of language, and this can only be done when one can command his thoughts in the face of an