I need scarcely remark that when a member enters for a Life Policy only, the premiums will be very much less.

Yours, &c., A. W.

Glen Sandfield, 13th May, 1878.

To the Editor of the Canada School Journal.

DEAR SIR,—Will you have the kindness to give, through the columns of your valuable JOURNAL, the most practical plan of conducting writing classes in ungraded public schools, in order that as much individual instruction as possible may be saved, and all pupils of about the same attainments write the same copy at the same time. Every competent teacher knows the necessity of explaining to his pupils, with chalk and black-board, the proper formation of all letters of a copy, illustrating the errors they are apt to run into, and pointing out the way to avoid them. A great difficulty, however, presents itself in an ungraded school, where only one teacher is employed, and has pupils ranging from the PRIMER class up to candidates for teachers' certificates. On account of the number of subjects that must be attended to, only about half an hour each day can be devoted to writing. How may general black board instruction, &c., be given to best advantage under such circumstances?

RURAL TEACHER.

This important question will be fully answered in Mr. Robinson's article, to appear in the next number of the JOURNAL.

THE HIRELING SCHOOLMASTER.

I have just finished reading an article under the above caption in the May number of the JOURNAL, and must allow that the writer would deal with the hireling very summarily and very safely. That there is such a class it would be needless to deny, and it is certainly in the interest of all concerned that they should turn over a new leaf with as little delay as possible. The plan recommended, however, would, I think, be liable to great abuse, and would be unnecessarily harsh if not abused. But there is another sufficient objection to bringing into use new machinery which does not seem to have been anticipated by Mr. May. The power to deal with hirelings is already in the hands of trustees and inspectors. Let them at the close of the teachers' term of office, give testimonials of efficiency only to those who merit them, and let trustees exact such from applicants for situations, and the thing is done with existing power. And if trustees and inspectors have not sufficient firmness and honesty to apply this mild but effectual remedy, it would scarcely be safe to invest them with the questionable one proposed.

Yours, etc., etc.,
JOHN CUSHNIE, S. S. No. 6, Downie.

LIABILITY OF TEACHERS.—At the Division Court at Bobcaygeon, May 14, Miss Esther Davis sued the Trustees of School Section No. 3, Verulam, for $42, the amount of municipal grant which the Inspector had kept back from said section on account of the teacher neglecting to keep the Daily Register properly and make out the Annual Report, and which amount the Trustees had deducted from her salary. Judgment was given for the defendants on the ground that the teacher had not fulfilled her contract. The case was held before Judge Dennistown, of Peterborough; Mr. Barrow, of Fenelon Falls, appeared for the plaintiff.

J. H. KNIGHT, P. S. Inspector.

Lindsay, May 16, 1878.

Mathematical Department.

Communications intended for this part of the JOURNAL should be on separate sheets, written on only one side, and properly paged to prevent mistakes.
ALFRED BAKER, B.A., EDITOR.

PROBLEMS PROPOSED IN APRIL NUMBER.

1. For this we refer our readers to the Philosophical Magazine for 1874, where will be found Mr. Glashan's own solution.

2. From the first two equations, if m be the common root, eliminating the first two terms, we have $m = \frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}$. Eliminating the second two terms, we have $m^2 = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}$; whence $\frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} = \left(\frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}\right)^2$, — the condition that the first two equations may have a common root. This root is $\frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}$; and substituting this for m in the third equation we obtain the condition that this root may be common to the third equation also. Hence conditions required are:

$$\frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} = \left(\frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}\right)^2 = -\frac{b_3}{a_3} \cdot \frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1} - \frac{c_3}{a_3}.$$

No satisfactory solution was given.

J. A. C.—You will find that your second condition may be derived from the previous one by multiplying both numerator and denominator of the first fraction by a_1, and of the second fraction by a_2, and subtracting numerators, and also denominators.

A. H.—You will find that your method would give two conditions in order that two quadratics might have a common root,—only one is necessary.

Mr. Andrew Hay, Kingston, gives the following answer to problem 3:

$$\text{Let } \frac{f(x)}{x-a} = Q + \frac{R}{x-a};\ \therefore f(x) = Q(x-a) + R.$$

If the remainder do not contain any function of x, the value of R will be independent of x; and in the above equation we may put $x = a$, then $R = f(a) = 0$. But if $f(x)$ be of such a form as $x^3 + x^2 + x^4$, for instance, it is plain that the remainder will contain some function of x, and $\therefore$ we may not assume that $x = a$, as R will not be independent of x. In such an example, the theorem does not hold true.

Mr. Andrew Hay gives the following solution of problem 4: To show that

$$\tan^{-1}\frac{2}{1^2} + \tan^{-1}\frac{2}{2^2} + \tan + ^{-1}\frac{2}{3^2} + \ldots = \frac{3\pi}{4}.$$

$$\text{We have } \tan^{-1}\frac{2}{1^2} + \tan^{-1}\frac{2}{2^2} = \tan^{-1}\frac{\frac{2}{1^2} + \frac{2}{2^2}}{1 - \frac{2}{1^2}\cdot\frac{2}{2^2}} = \tan^{-1}\infty = \frac{\pi}{2}.$$

$$\tan^{-1}\frac{2}{3^2} + \tan^{-1}\frac{2}{4^2} = \tan^{-1}\frac{\frac{2}{3^2} + \frac{2}{4^2}}{1 - \frac{2}{3^2}\cdot\frac{2}{4^2}} = \tan^{-1}\frac{5}{14}$$

$$\tan^{-1}\frac{5}{14} + \tan^{-1}\frac{2}{5^2} = \tan^{-1}\frac{9}{20}.$$

$$\tan^{-1}\frac{9}{20} + \tan^{-1}\frac{2}{6^2} = \tan^{-1}\frac{14}{27}.$$

$$\tan^{-1}\frac{14}{27} + \tan^{-1}\frac{2}{7^2} = \tan^{-1}\frac{20}{35}.$$

We observe that 5, 9, 14, 20, 27, and 14, 20, 27, 35, are two series of the 3rd order of figurate numbers, of which the nth terms are:

$\frac{1}{2}(n+2)(n+3) - 1$, and $\frac{1}{2}(n+4)(n+5) - 1$, respectively.

Therefore the nth term of the series $\tan^{-1}\frac{5}{14}$, $\tan^{-1}\frac{9}{20}$, &c., is $\tan^{-1}\frac{(n+2)(n+3)-2}{(n+4)(n+5)-2}$. This may be rigidly established by the method of induction. For, assume the law true for the nth term. The $(n+1)$th will be

$$\tan^{-1}\frac{\frac{(n+2)(n+3)-2}{(n+4)(n+5)-2} + \frac{2}{(n+4)^2}}{\ldots},$$