so in the future. Continued vigilance in promoting the best interests of education, and likewise those of educators. The whole question rests with the teachers themselves, if they be *true to one another* and earnestly enter into the matter, victory will be theirs, though the fight may be long and doubtful, but if they be indifferent or supine the end can easily be forecast.

"Let us arise and build."

SCHOOL WORK.

MATHEMATICS.

ARCHIBALD MACMURCHY, M.A., TORONTO, EDITOR.

UNIVERSITY OF TORONTO.

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First Examination.

ALGEBRA AND TRIGONOMETRY.

Examiner—J. W. Reid, B.A.

1. Solve the equations,

(*a*) $x+y+xy=11$, $x^2y+xy^2=30$.

(*b*) $\dfrac{yz}{x}=a$, $\dfrac{xz}{y}=b$, $\dfrac{xy}{z}=c$.

2. To complete a certain work A requires m times as many days as B and C together; B requires n times as many as A and C together, and C requires p times as many as A and B together; compare the times in which each would do it; and prove that $\dfrac{1}{m+1}+\dfrac{1}{n+1}+\dfrac{1}{p+1}=1$.

3. If $a:b=c:d$; shew that

$$a-c-(b-d)=\frac{(a-b)(a-c)}{a}$$

$$\frac{1}{a}+\frac{1}{d}=\frac{1}{b}+\frac{1}{c}+\frac{(a-b)(a-c)}{abc}.$$

4. When is a series of quantities said to be in Geometrical Progression?

Find the sum of such a series.

Prove the rules for reducing the various kinds of decimals to vulgar fractions.

5. Given x and y, the 1st and 2nd terms of an Harmonical Progression, continue the series, and write down the nth term.

There are 4 numbers, of which the first 3 are in Arithmetical Progression, the last 3 in Harmonical Progression; shew that the 1st : 2nd = 3rd : 4th.

6. Define the trigonometrical ratios of an angle, and investigate the different relations existing between them.

If $\tan A=\frac{7}{12}$, find the values of the other relations.

7. Determine the angle A from the equations

(*a*) $2\sin A=\tan A$.

(*b*) $\tan A+\cot A=4$.

8. Prove the formulae:

$\sin(A\pm B)=\sin A\cos B\pm\cos A\sin B$

$\sin(A-B)\sin C+\sin(C-A)\sin B+\sin(B-C)\sin A=0$.

9. If A, B and C are the angles of a triangle, prove $\sin 2A+\sin 2B+\sin 2C=4\sin A\sin B\sin C$.

10. With the usual notation for the sides and angles of a triangle, prove

$$\cos A=\frac{b^2+c^2-a^2}{2bc}.$$

$$\frac{\sin(A-B)}{\sin C}=\frac{a^2-b^2}{c^2}.$$

11. If $s=\dfrac{a+b+c}{2}$ prove that the area of the triangle whose sides are a, b, c, is $\sqrt{s(s-a)(s-b)(s-c)}$.

Shew that the same area is also equal to $\frac{1}{4}(a+b+c)^2\tan\frac{1}{2}A\tan\frac{1}{2}B\tan\frac{1}{2}C$.

First and Second Examinations.

LATIN AND GREEK GRAMMAR—PASS ONLY.

Examiner—Geo. H. Robinson, M.A.

1. Decline in combination, *ille celeber ductor*; μέγα βασιλεύς.