# SCHOOL WORK.

## MATHEMATICS.

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

## EDUCATION DEPARTMENT, ONTARIO.

### JULY EXAMINATIONS, 1885.

*Second Class Teachers.*

#### ALGEBRA.

*Examiner*—J. C. Glashan.

1. From $a(b+c)^2+b(c+a)^2+c(a+b)^2$ take $(a-b)(a-c)(b+c)+(b-c)(b-a)(c+a)+(c-a)(c-b)(a+b)$. *Ans.* $12abc$. [10.]

2. Multiply $\frac{x}{a}-\frac{a}{x}-\frac{y}{b}+\frac{b}{y}$ by $\frac{x}{a}-\frac{a}{x}+\frac{y}{b}-\frac{b}{y}$

*Ans.* $\frac{x^2}{a^2}-\frac{y^2}{b^2}-\frac{b^2}{y^2}+\frac{a^2}{x^2}$. [10.]

3. Divide $(x^3-1)(a^3-a^2)-(x^2-1)(a^2-4a)+3(x+2)(a-1)+3$ by $ax^2+(x+1)(a-1)$.

*Ans.* $a^2x-ax-a^2+a+3$. [15.]

4. Resolve $2-\frac{b^2+c^2-a^2}{bc}$ into the product of two factors.

*Ans.* $\frac{(a+b-c)(a-b+c)}{bc}$. [10.]

5. It being given that $2(a^4+b^4+c^4+d^4)-(a^2+b^2+c^2+d^2)+8abcd$, is the product of four linear factors of which one is $a+b+c+d$, show how to deduce therefrom what the other factors *must* be. [20.]

6. Prove that if $\frac{ab}{cd}=\frac{a^2+b^2}{c^2+d^2}$

then will $\frac{AB}{CD}=\frac{A^2+B^2}{C^2+D^2}$,

wherein $A=a+b+c+d$,
$B=a+b-c-d$,
$C=a-b+c-d$,
$D=a-b-c+d$. [20.]

7. Solve $\sqrt{x}-\sqrt{5}=\sqrt{(x-5)}$ *Ans.* $x=5$. [15.]

8. Determine $a$, $b$ and $c$ so that the two systems of equations

$$\left.\begin{aligned} ax+by-cz&=4,\\ ax-by+cz&=8,\\ -ax+by+cz&=16\end{aligned}\right\} \text{ and } \left\{\begin{aligned} 2x-y+3z&=9,\\ 3x+2y-2z&=1,\\ -x+y+z&=4,\end{aligned}\right.$$

may be satisfied by the same values of $x$, $y$ and $z$. *Ans.* $a=6$, $b=5$, $c=4$. [15.]

9. Solve $(1-x)(x-2)+(3-x)(x-4)-(5-x)(x-10)=0$. *Ans.* $x=4$ or $-9$. [15.]

10. The circumference of a hind-wheel of a carriage is greater by one yard than that of the front-wheel, but in travelling sixty-three yards, the front-wheel makes four revolutions more than the hind-wheel. Find the circumference of the hind-wheel. *Ans.* $4\frac{1}{2}$ yards. [20.]

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#### ARITHMETIC.

*Examiner*—J. A. McLellan, LL.D.

NOTE.—80 per cent. of this paper will be considered a full paper.

Solutions by Geo. Ross, B.A., Mathematical Master C. I., Galt.

1. "Every operation of division may be viewed as giving the answer to two different questions." Explain and illustrate this statement.

1. A good treatment of this question will be found in Clifford's "Common Sense of the Exact Sciences," pp. 42-45.

2. Show that if the greater of two integers be divided by the other, the greatest common measure of the two numbers is the same as the G. C. M. of *remainder* and *divisor*.

2. Book-work.

3. Divide the fraction $\frac{7}{8}$ into two such parts that 4 times one of them added to $5\frac{1}{2}$ times the other may make $1\frac{1}{3}$.