SCHOOL WORK.

MATHEMATICS.

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

SELECTED PROBLEMS.

BY J. L. COX, B.A., Math. Master, C. I., Collingwood.

51. Express $\frac{9}{18}$ in a series of fractions of the form $\frac{1}{p_1}+\frac{1}{p_1 p_2}+\frac{1}{p_1 p_2 p_3}$, etc.

52. Given

$$\left.\begin{aligned}\frac{1}{1+x+xz}+\frac{y}{1+y+xy}+\frac{yz}{1+z+yz}=1\\ \frac{x}{1+x+xz}+\frac{xy}{1+y+xy}+\frac{1}{1+z+yz}=1\end{aligned}\right\}$$

none of the denominators being zero, then $x=y=z$.

53. If $\left(\frac{x}{a}\right)^m+\left(\frac{y}{b}\right)^m+\left(\frac{z}{c}\right)^m=1$

$$=\left(\frac{a}{d}\right)^m+\left(\frac{b}{d}\right)+\left(\frac{c}{d}\right)^m$$

and $\frac{x^m}{a^{m+n}}=\frac{y^m}{b^{m+n}}=\frac{z^m}{c^{m+n}}$

show that $\left(\Sigma x^{\frac{mn}{m+n}}\right)\left(\Sigma x^{\frac{m2}{m+n}}\right)=d_m$

54. If $x^2+y^2=z^2$, then $\{(x^2+z^2)y\}^2+\{(x^2-y^2)z\}^2=\{(y^2+z^2)x\}^2$.

55. If S_n denote the sum of the nth powers of the roots of a quadratic equation, then the equation is $(S_n S_{n-2}-S_{n-1})^2x^2-(S_{n+1}S_{n-2}-S_n S_{n-1})x+(S_{n+1}S_{n-1}-S_n{}^2)=0$.

56. O is the centre of the circle, circumscribing triangle ABC, AO, BO and CO, cut the opposite sides respectively in D, E, F, show that $\frac{1}{AD}+\frac{1}{BE}+\frac{1}{CF}=\frac{2}{R}$.

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57. Solve (1) $x^4+1=0$;
(2) $x^4+1=d(x+1)^4$.

58. If $x^2=px+q$ and $\alpha+\beta=p$, $\alpha\beta=-q$, show that $x^n=\frac{\alpha^n-\beta^n}{\alpha-\beta}x+\frac{\alpha^{n-1}-\beta^{n-1}}{\alpha-\beta}q$.

59. From the series in $A. P.$, of which the sum of the 1st n terms is n^2, deduce the integral solutions of $x^2=y^2+z^2$; *i.e.*, find all the sets of integral values for the sides of a right angled triangle.

60. If a, b, c be the pth, qth and rth terms respectively, both of an $A. P.$ and a $G. P.$, prove that $a^{b-c}\cdot b^{c-a}\cdot c^{a-b}=1$.

61. Show without the Binomial Theorem that the total number of combinations of n things 1, 2, 3....up to n together is 2^n-1.

62. Find the number of different sentences, each of eight words, which can be formed from the 26 letters, a, b, c, etc., without repetitions.

63. In a cricket match 80 runs are made from the bat by one side (11 men). In how many ways may these be distributed?

64. Obtain an expression for the sum of $1, 2, 3, 4, 5....r+2,\ 3, 4....r+1\ .\ +$etc., $+n(n+1)....(n+r-1)$.

65. Show that $\sqrt[m+n+p+q]{abcd}$ lies in magnitude between the greatest and least of the quantities $\sqrt[m]{a}$, $\sqrt[n]{b}$, $\sqrt[p]{c}$, $\sqrt[q]{d}$.

66. Find an expression for the remainder after n terms of the expansion of $(1-x)^{-2}$.

CLASSICS.

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BRADLEY'S ARNOLD.

BY M. A.

Exercise 31.

1. Dubitari non potui quin, a fratris tui ingenio alienissimum esset mentiri. 2. Omnes nostri similes diligere solemus. 3. Inhoc tam difficili tempore, vereor ut amicus tuus, homo levissimus, patris sui, viri præstantissimi, similis evadat. 4. Quæ res in vulgus fuit gratissima, eadem regi ingratissima. 5. Patris ille sui consiliis jamdiu adversabatur, cujus ipse fuit omnibus rebus simillimus. 6. Patris mei et propinquus fuit et ei a puero amicissimus; idem in