

ONTARIO TEACHERS' ASSOCIATION.

The twenty-third annual convention of the Ontario Teachers' Association will be held in Toronto, on Tuesday, Wednesday, and Thursday, August 14th, 15th, and 16th, 1883.

PROGRAMME.

General Association.

- "Literature in Schools"—MR. D. J. GOGGIN, Port Hope.
- "School Curriculum"—MR. JAMES DUNCAN, Windsor.
- "The advisability of a change in the administration of the School Law by the appointment of a Chief Superintendent of Education and a Council of Public Instruction in lieu of a Minister of Education"—JOHN E. BRYANT, M.A., Galt.
- "Licensing of Teachers"—MR. JOHN DEARNESS, London.
- "Moral Education"—JOHN MILLAR, B.A., St. Thomas.
- "Examinations and Examiners"—MR. F. C. POWELL, Kincardine.

Evening Addresses will be delivered by PROFESSOR MARSHALL, of Queen's University, Kingston; WM. OLDRIGHT, M.A., M.D., of Toronto, on "School Hygiene;" and by the President of the Association, ARCHIBALD MACMURCHY, M.A., Toronto.

Public School Section.

- "Hygiene"—MR. ROBERT ALEXANDER, Galt.
- "H. S. Entrance Examination"—MR. WM. RANNIE, Newmarket.
- "Revision of Programme"—MR. JAMES DUNCAN, Windsor.

Public School Inspectors' Section.

The most effective application of Government Aid to Public Education and the basis of distribution of the School Fund.
Salary and remuneration of Public School Inspectors.
Public School inspection and reporting to local authorities.
Lecturing and the work outside of the routine of inspection.
Law versus Regulations.
Examiners—Provincial and County Board.

High School Section.

- "Local Examinations"—DR. FOREST, H. M., Bradford H. S.
- "Entrance Examinations"—JAS. TURNBULL, B.A., H. M., Clinton High School.
- "The Professional Training of H. S. Teachers"—PRINCIPAL McHENRY, Cobourg Collegiate Institute.
- "Natural Science at Matriculation"—PRINCIPAL SPOTTON, Barrie Collegiate Institute.
- "The Conduct of Departmental Examinations"—PRINCIPAL BRYANT, Galt Collegiate Institute.

The Executive Committee earnestly calls the attention of all who are engaged in the work of Education to the importance of attending the above meeting. The Railways, as usual, will issue Return Tickets at reduced rates to those attending the meeting. Any further information respecting the Convention may be had on application to the Secretary of the Association.

R. W. DOAN,

Secretary,

216 CARLTON STREET,

May 31st, 1883.

TORONTO.

Mathematical Department.

NOTES ON THE HISTORY OF ALGEBRA.

Sir Isaac Newton called Algebra "Universal Arithmetic." The progressive improvements and discoveries in this science have been very slow and gradual in different ages and in distant countries and extend over many centuries.

The powers of numeration at first must have been very limited before the invention of the art of writing, but there are no records known which enable us to trace the steps of progress in the science of numbers. The earliest methods of numbering would naturally be limited to the naming of such numbers as the necessities of the people required. The next improvements would be found in those nations that applied themselves to commerce and navigation. The Egyptians and Phœnicians made the first improvements in the use and calculation of numbers. But the Egyptian system of arithmetic could not have been very perfect when Joseph was prime minister, for it is recorded that he left off numbering the quantity of corn laid up in the cities, "for the quantity was without number." Ancient history ascribes to the Phœnicians the invention of casting accounts, and keeping registers of everything that relates to the affairs of merchants. Improved methods would be necessary in managing public revenues, and men would naturally be led to find out ways of abridging and improving their methods of calculation.

The operations of arithmetic depend on the two simple processes of addition and subtraction, and these presuppose numeration which furnishes arithmetic with the crude material for all its operations. Arithmetic most probably began with practical numeration, of several objects, as the number of a herd of cattle or of a flock of sheep. It is highly probable that the fingers of one or both hands were the first instruments used to assist them in the counting by sets. Homer represents Proteus as counting his sea-calves by fives—that is, by his fingers; and in common with all early Greek writers Homer employs the word *πεντακην*, which literally means to count by the five fingers. Æschylus and Plutarch also supply evidence of the same kind.

The remains of the early Greek writers on numbers are very scanty. The leading names are Pythagoras, Euclid, Archimedes, Diophantus, Pappus, and Proclus, down to the end of the fourth century, but our limits preclude a detailed statement of their several improvements and discoveries.

It is uncertain whether the Hindus received their astronomical and other mathematical sciences from the Greeks, or the Greeks theirs from the Hindus. Perhaps both received their knowledge from some independent source. The Hindu notation is distinguished by "the device of place," which has given both perfection and simplicity to their system of calculation. In 1817 Mr. Colebrooke published a translation of four ancient treatises on Arithmetic and Algebra, written in the Sanscrit language. They are found in the midst of a system of astronomy entitled "*Brahma-Siddhanta*," a fact which shows that they were not probably of recent invention. Nearly all the examples in the algebra relate to astronomy, and the whole of the treatises are in Sanscrit verse. The probable date is A.D. 628, and their author was Brahme Gupta. The other two treatises are entitled *Lilavati* and the *Vija Ganita*, the first on arithmetic, the second on algebra. Their author, Bhāscara Acharya, composed them about A.D. 1114. The *Vija Ganita* contains nine chapters explaining positive and negative quantities, surds, simple and quadratic equations, indeterminate equations of the second degree, and the application of algebra to geometry.

It appears the Persians were indebted to the Arabians for whatever mathematical knowledge they acquired, as the Arabians had been to the Greeks and Hindus. The *Risala Hisab* is a short treatise on arithmetic and geometry written in the Persian language by Kāzi Zādeh al Rūmī about A.D. 1450.

Bāha Eddin, who died about A.D. 1652, was the author of an algebra called "*Kholasat al Hisab*," which was translated into the Persian language. The Hindu *Lilavati* and the *Vija Ganita* were also translated into Persian. The following extract from a Persian algebra in verse shows that they borrowed their terminology from the Arabs:—"Complete the side in which the expression *illa* (minus) occurs, and add as much to the other side, O learned man: this is in correct language called *jabr*. In making the equation mark this: it may happen that some terms are cognate and equal on each side, without distinction; these you must on both sides remove, and this you call *mokabalah*."