ONTARIO CAS SUMMER 2006 WORKSHOPS
LEARNING ALGEBRA USING A VARIETY OF TOOLS

Brought to you by TI Canada

Ottawa	August 10th & 11th
London	August 14th & 15th
Sudbury	August 17th & 18th
Brampton	August 21st & 22nd
Toronto	August 28th & 29th

TI-nspire™

These two day workshops will introduce participants to a range of CAS technologies, including **TI 89**, **TI Voyage 200**, and the exciting, new **TI-nspire**. Participants will work through CAS learning activities focused on the revised grades 9, 10 and 11 Ontario Mathematics Curriculum.



The curriculum …

In the 2005 Revised Ontario Grades 9 and 10 Mathematics Curriculum, and 2006 Revised Ontario Grade 11 Curriculum, you will find the following expectations that refer explicitly to computer algebra systems (CAS):

- *add and subtract polynomials involving the same variable up to degree three [e.g., (2x + 1) + (x2 – 3x + 4)], using a variety of tools (e.g., algebra tiles, **computer algebra systems**, paper and pencil)*
- *multiply a polynomial by a monomial involving the same variable to give results up to degree three [e.g., (2x)(3x), 2x(x + 3)], using a variety of tools (e.g., algebra tiles, drawings, **computer algebra systems**, paper and pencil)*
- *solve first-degree equations with non-fractional coefficients, using a variety of tools (e.g., **computer algebra systems**, paper and pencil) and strategies (e.g., the balance analogy, algebraic strategies)*

The teacher …

As you can see, every time computer algebra systems (CAS) are referenced, it is in the context of "using a variety of tools", where the three tools most frequently referenced are algebra tiles, computer algebra systems, and paper and pencil. From our lived experience as secondary math educators with previous curricula, it is safe to assume that we all have:

- an excellent sense of what learning algebra with paper and pencil looks like,
- a reasonable sense of what learning algebra with algebra tiles looks like, and
- a minimal sense of what learning algebra with computer algebra systems(CAS) looks like.

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The student …

Shifting focus to our students, it is clear that all our secondary students learn algebra effortlessly using paper and pencil – NOT! Next to fractions in elementary mathematics, algebra is probably the most commonly referenced area of math that adults refer to when they talk about where math ceased to make sense to them. So … here we are with a newly revised grades 9, 10, and 11 mathematics curriculum in Ontario and a society that expects ALL students to learn algebra. Is this possible using only paper and pencil?

The recently deceased mathematics education researcher, James Kaput, who championed the notion of the democratization of mathematics, wrote:

> *"Now we must find ways to make major mathematical ideas learnable by the large majority of people, infinitely more diverse than the geniuses who originally built them. Fortunately we are no longer constrained by static, inert media - unless we choose to be."*
> *www.simcalc.umassd.edu/downloads/KaputAthens.pdf*

The newly revised Ontario Mathematics Curriculum challenges us to support student learning in algebra "using a variety of tools". Computer algebra systems (CAS), algebra tiles, and paper and pencil are all necessary thinking tools to uncover meaning in algebra for all our students. These workshops will give participants an opportunity to learn what learning algebra "using a variety of tools" looks like.

REGISTRATION INFORMATION

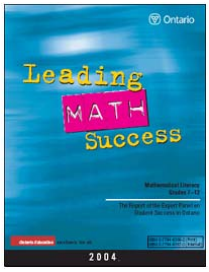
Registration cost is only $50! Lunches will be provided.

Limited spaces will be available, so register early.

Please register online at www.vlearning.ca and send registration cheques, payable to "vLearning" to:

vLearning
48A Woodford Way
Nepean, Ontario, K2J 4B9

"In an effective mathematics program, students learn in the presence of technology. Technology should influence the mathematics content taught and how it is taught. Powerful assistive and enabling computer and handheld technologies should be used seamlessly in teaching, learning, and assessment." p. 47, Leading Math Success



"Society has evolved from the industrial age to the information age. The industrial-style classroom is obsolete. Schools must seize the opportunity to integrate technology into the learning environment in effective and powerful ways that support improved student learning." p. 47, Leading Math Success