

# Honda - Math Machines 2010 Workshop

5-Day Institute: August 2-6, 2010 (Monday through Friday, 8:00 – 4:00)

One-Day Follow-Up: Saturday, Nov. 13<sup>th</sup>, 2010 (tentative date)

**Rhodes State College -- Lima, Ohio**

Teachers of mathematics, science and technology are invited to build their own Science And Mathematics (SAM) Vehicle and two other “math machines” for use in their classroom. They will learn to use the math machines in activities where students apply mathematics and science concepts to carry out authentic, work-related tasks.



## Who Should Participate?

Applicants should be secondary school or introductory college teachers of Math, Science, or Technology who want to use authentic real-world activities in their classrooms. Preference will be given to teams of teachers who can continue to collaborate during the school year. **No prior experience with programming or electronics is required!**

## What Will Participants Take Back to their Classrooms?

Participants will make-and-take the SAM Vehicle, a Pointer and an RGB Color Mixer, plus an interface to connect the 3 math machines to **either** a TI-83/84 family calculator **or** a Windows computer. Participants who prefer calculator control will receive a CBL2 interface. Participants who prefer computer control will receive a Vernier SersorDAQ interface. All participants will receive a CD with classroom activities and all the software needed to operate the math machines.\*

## What Do Participants Provide?

Participants who select the *calculator control* option must bring a TI-83 or TI-84 calculator (any version) on which the control programs can be loaded. They are also encouraged to bring a laptop computer for use in downloading, storing and editing the calculator programs.

For *computer control*, participants must bring a Windows laptop computer on which they can install the programs necessary to operate the math machines.

## What about Expenses?

Thanks to support from Honda of America Mfg., WeEXCEL (West Ohio Center of Excellence for Science and Mathematics Education) and the West Central Ohio Tech Prep Consortium, the cost for qualified participants is **only \$50**, including the workshop,

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\* Calculator control provides the advantage of portability and it allows simple exchanges using student- or class-calculators. The calculator-controlled SAM vehicle is also appropriate for teams interested in the "MathBot" competition held each Spring as part of the National Robotics Challenge in Marion, Ohio. Computer control has the advantage of more advanced mathematical power, including the ability to enter free-form algebraic functions. Contact Fred Thomas if you have questions about which is better for you.

three Math Machines, calculator or computer interface, 2 Vernier probes and the control software. (This is much less than the cost of the CBL2 or SersorDAQ interface alone.) Payment should be submitted immediately after participants are notified of their acceptance. Travel, lodging and meals (including lunch) are the responsibility of the participants or their school.

### Can I Earn Credit for the Workshop?

Participants have the option of receiving up to 3 semester hours of graduate credit through Ashland University at a cost of \$172 per credit. A representative of Ashland University will be present at the start of the workshop to process registration and payment.

### How Do I Apply?

Complete the attached application form and submit it as soon as possible. Selection of participants will begin immediately and continue as long as space is available.

### For additional information, please contact:

Dr. Fred Thomas  
Learning with Math Machines, Inc.  
1014 Merrywood Drive  
Englewood, OH 45322

Voice phone: 937-832-0792  
Fax: 614-455-0856  
Email: [fred.thomas@mathmachines.net](mailto:fred.thomas@mathmachines.net)  
Web: [www.mathmachines.net](http://www.mathmachines.net)

### Workshop Facilitators:

Fred Thomas, Science & computer controls, Learning with Math Machines  
Robert Chaney, Mathematics & calculator controls, Sinclair Community College  
Michelle Younker, Local arrangements, Rhodes State College

## **Sponsored by Honda of America Mfg.**

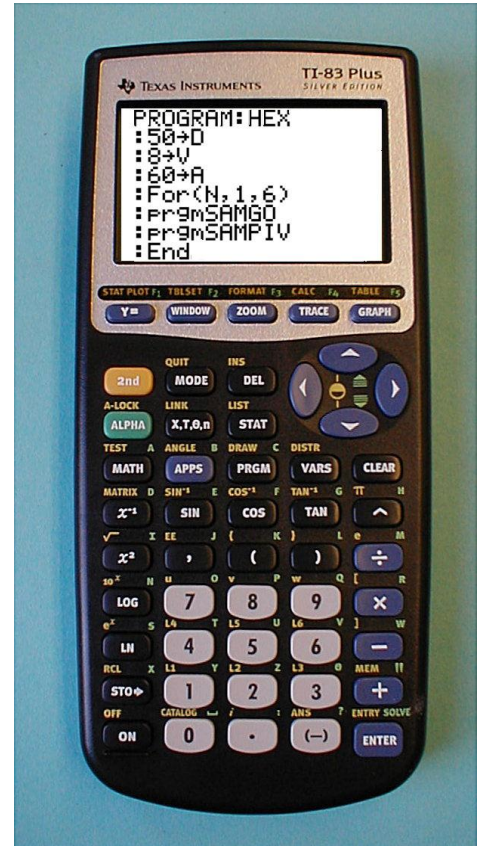
in cooperation with WeEXCEL (West Ohio Center of Excellence for Science and Mathematics Education), the West Central Ohio Tech Prep Consortium and Rhodes State College,

Additional support provided by Vernier Software and Technology.

This material is based in part upon work supported by the National Science Foundation under Grant No. DUE-0202202. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.



A sample student- written program for the **calculator-controlled SAM vehicle** is shown at right. The program makes the SAM vehicle trace a hexagonal path (50 cm on each side), moving at a speed of 8 cm/s.



A sample control panel for the **computer-controlled vehicle** is shown below. The student or instructor can enter a free-form algebraic equation into the box using either analytical or iterative forms. The example shown illustrates a uniformly accelerated motion in which the vehicle (perhaps carrying your class mascot) moves forward with an initial velocity of 8 cm/s, slows gradually to a stop after 10 seconds and then returns to its original position with increasingly negative velocity.

**Programmed Motion**  
for the Math Machines ACV

Duration: 20 s      Time: 14.32 s      Motion Detector?  yes  no      Calculate x

Velocity:  $v = .06 - .006 * t$  m/s

Initial Velocity:  $v_0 = 0.06$  m/s      Acceleration:  $a = -0.006$  m/s<sup>2</sup>

Initial Position:  $x_0 = 0$  m      Calculation/ Data Interval:  $d = 0.02$  s

SensorDaq:  $\frac{1}{2}$  Dev2      Warnings: Velocity  Position  Equations       Late cycles: 0

Position, x: 0.2320 m

Velocity, v: -0.0259 m/s

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# Honda - Math Machines 2010 Workshop Application

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**Rhodes State College -- Lima, Ohio**

Name: \_\_\_\_\_

School: \_\_\_\_\_ Position: \_\_\_\_\_

School Address: \_\_\_\_\_

City, State & Zip code \_\_\_\_\_

Home Address: \_\_\_\_\_

City, State & Zip code \_\_\_\_\_

School Phone: \_\_\_\_\_ School E-mail: \_\_\_\_\_

Home Phone: \_\_\_\_\_ Home E-mail: \_\_\_\_\_

If you are applying as part of a team, list the names of the other team members below.  
(Each individual must submit a separate application form.)

\_\_\_\_\_

What is your primary teaching area?  Mathematics  Science  Technology

Other (Please specify) \_\_\_\_\_

How long have you been teaching in this area?

\_\_\_\_\_

What subjects and levels do you teach regularly?

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In what ways do you expect that you and your students will benefit from this workshop?

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(continued on reverse)

If you want, describe an aspect of your background, your expertise, your personality or anything else that would help you in contributing to the success of this workshop.

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- Check one:**
- Calculator control (with CBL2 interface)
  - Computer control (with SensorDAQ interface)
  - Contact me to discuss these options

Selection of participants will begin immediately and continue as long as space is available.

**Mail, fax or email the completed application to:**

Dr. Fred Thomas  
Learning with Math Machines, Inc.  
1014 Merrywood Drive  
Englewood, OH 45322

Voice phone: 937-832-0792  
Fax: 614-455-0856  
Email: fred.thomas@mathmachines.net  
Web: www.mathmachines.net

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