



**A Look at Quiz Systems in Mathematical Subjects**

**A MapleTA Demonstration  
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## Outline

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- Online quiz systems
- Math aware computer assessment
- Areas of use and general features
- Question & assignment types
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- UW & MapleTA
- Future
- Contacts
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- Readings



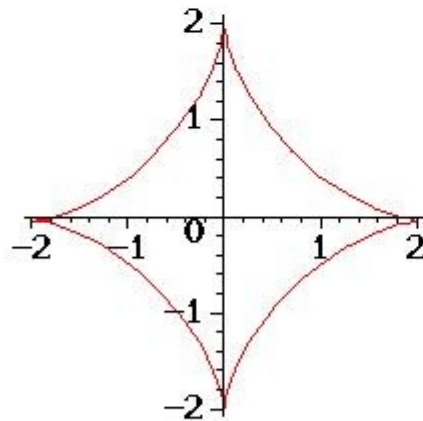
## Opportunities



MATH 138, WatItIs Demo

**Question 8: (1 point)**

Find the arc length of the hypocycloid  $y^{(2/3)} + x^{(2/3)} = 2^{(2/3)}$  in the first quadrant.



This question accepts numbers or formulas.  
[Plot](#) | [Help](#) | [Change Math Entry Mode](#) | [Preview](#)  
[Hint 1](#)



## Online Quiz Systems

- More than quizzes:
  - skill assessment, development, mastery
  - pre-qualification
  - pre-class warmup
  - post-class review, post-module assessment
  - independent self-study
  - test, exam practice
- And
  - supervised tests, exams



## Math Aware Computer Assessment

- Math aware means
  - Treating equivalent expressions the same
    - $\frac{1}{2}$  and  $.5$ ,  $2(x+4)$  and  $2x+8$  and  $8+2x$
  - Finer control of feedback
    - e.g. recheck your answer  $3(y^2+2)^2$ , the derivative  $12y(y^2+2)$  is not the original integrand
  - Examining parts of the answer
    - Checking for typical mistakes
      - e.g. the constant of integration is missing



## Math awareness cont

- More choice in range and randomization for question parameterization
- Can ask to make math objects with given properties rather than ask just to identify properties e.g. create a quadratic function in  $x$  through pts  $(1,3)$  and  $(4,3)$ .



## Areas of use/General features

- Math: algebra, calculus, linear algebra, probability, statistics, differential equations
- Science & Engineering courses
- Professional development, self-study
- Distance education
  
- Rapid feedback
- Expert content
- Available anytime, anywhere





## Question & Assignment Types

- Question types
  - Maple graded – full power of Maple to evaluate and reply, including plots
  - Clickable image – e.g. locate stationary point
  - MCQ, T/F, matching, multiple selection, short ans
- Assignment types
  - Mix of features: anonymous/password, recorded grade, solution, hints, set size & time, unlimited
- Works with HTML, javascript, MathML, Flash



## Student comments

- Generally positive
- Like availability of online systems in general
  - Wide range of login times and places
- Motivated to keep trying for answer – persistence rewarded
- Liked immediate feedback – building confidence
- Missed showing intermediate steps in answer – a matter of partial credit



## UW & MapleTA

- Early collaboration: Maplesoft, Brownstone EDU
- MapleTA demo at 2005 Maple Conference (WLU)
- 2005 Maplesoft.com hosted a demo MapleTA account for Mathematics Faculty
- 2005 Maplesoft.com provided server software
- '05-'06 interest from STAT 202, 206, 211, 230, ACTSCI 231, MATH 138
- Fall 2006 licenced MapleTA licence for MFCE/Math



## Future

- More assignment control features
- Ever-improving math editing
- Expanding availability of shareable question banks
- Integration with course management systems like UW-ACE (roster, authentication, gradebook)



## Contacts

- MapleTA accounts & statistic courses: Sean Scott, STAT/ACTSI/MFCF, [sm3scott@math.uwaterloo.ca](mailto:sm3scott@math.uwaterloo.ca), x37175
- Math, CS, Engineering, Stats courses: Paul Kates, LT3, [pkates@uwaterloo.ca](mailto:pkates@uwaterloo.ca), x37047
- Gavin Fitzpatrick, [gfitzpatrick@maplesoft.com](mailto:gfitzpatrick@maplesoft.com), 1-800-267-6583x271
- MapleTA demo course – try it [mirfak.math.uwaterloo.ca:8080/classes/math138/](http://mirfak.math.uwaterloo.ca:8080/classes/math138/)



## MapleTA web sites

- MapleTA home page:  
[www.maplesoft.com/products/mapleta/index.aspx](http://www.maplesoft.com/products/mapleta/index.aspx)
- Getting started MapleTA (75p)  
[www.maplesoft.com/documentation\\_center/](http://www.maplesoft.com/documentation_center/)
- Suny use of MapleTA with 3500 students for pre-course assessment,  
[www.maplesoft.com/company/casestudies/suny\\_ta.aspx](http://www.maplesoft.com/company/casestudies/suny_ta.aspx)

- *Mathematics on the threshold*, A Heck, L van Gastel  
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- *Asking the Right Questions*, Lynn A. Steen  
[www.maa.org/saum/cases/steen1105-saum.pdf](http://www.maa.org/saum/cases/steen1105-saum.pdf)
- *Assessing mathematics automatically using computer algebra and the internet*, C.J Sangwin,  
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[web.mat.bham.ac.uk/C.J.Sangwin/Publications/tma03.pdf](http://web.mat.bham.ac.uk/C.J.Sangwin/Publications/tma03.pdf)