"Waves Go Round!" An Exploration and Investigation on the Functions, $y = \sin x$ and $y = \cos x$

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Conference for the Advancement of Mathematics Teaching

Goals of the Rice University Mathematics Leadership Institute

- Develop teacher leaders
- Expand teacher knowledge in mathematics and pedagogy, to develop highly qualified mathematics teachers

Goals of the Rice University Mathematics Leadership Institute

- Develop highly qualified teachers who are willing to create and share innovative and effective teaching and learning activities

Goals of the Rice University Mathematics Leadership Institute

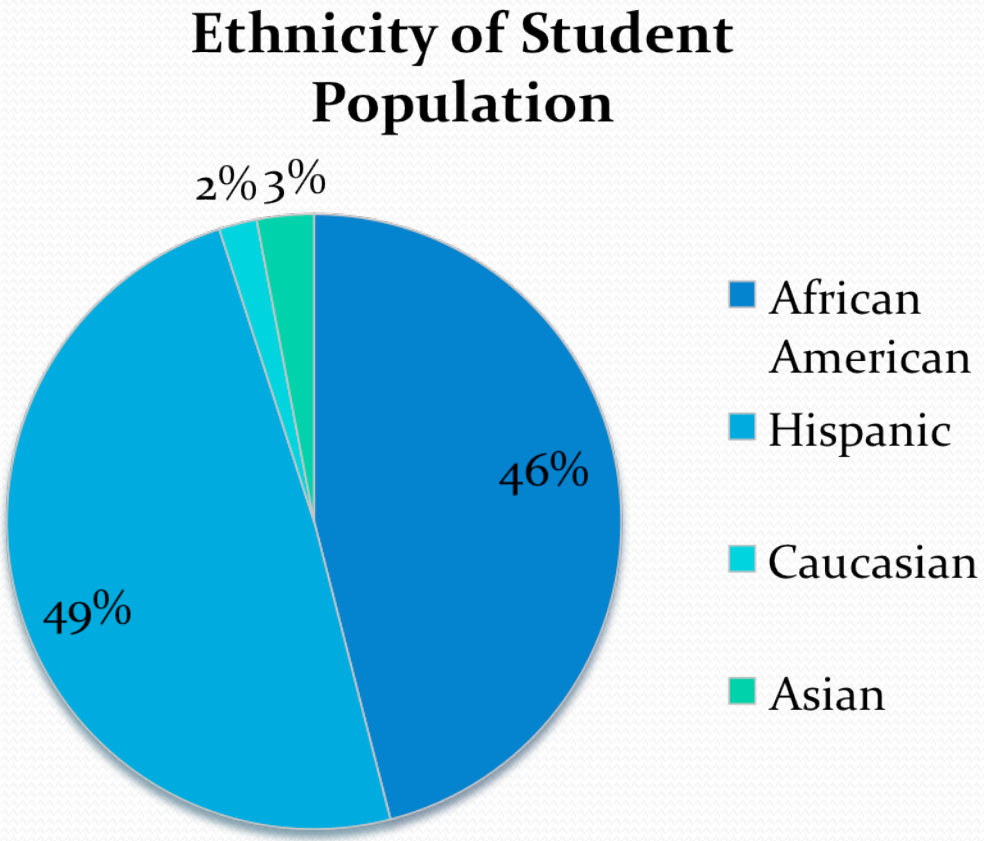
- Provide instructional support to teachers through a network of high school teachers and college faculty members

Goals of the Rice University Mathematics Leadership Institute

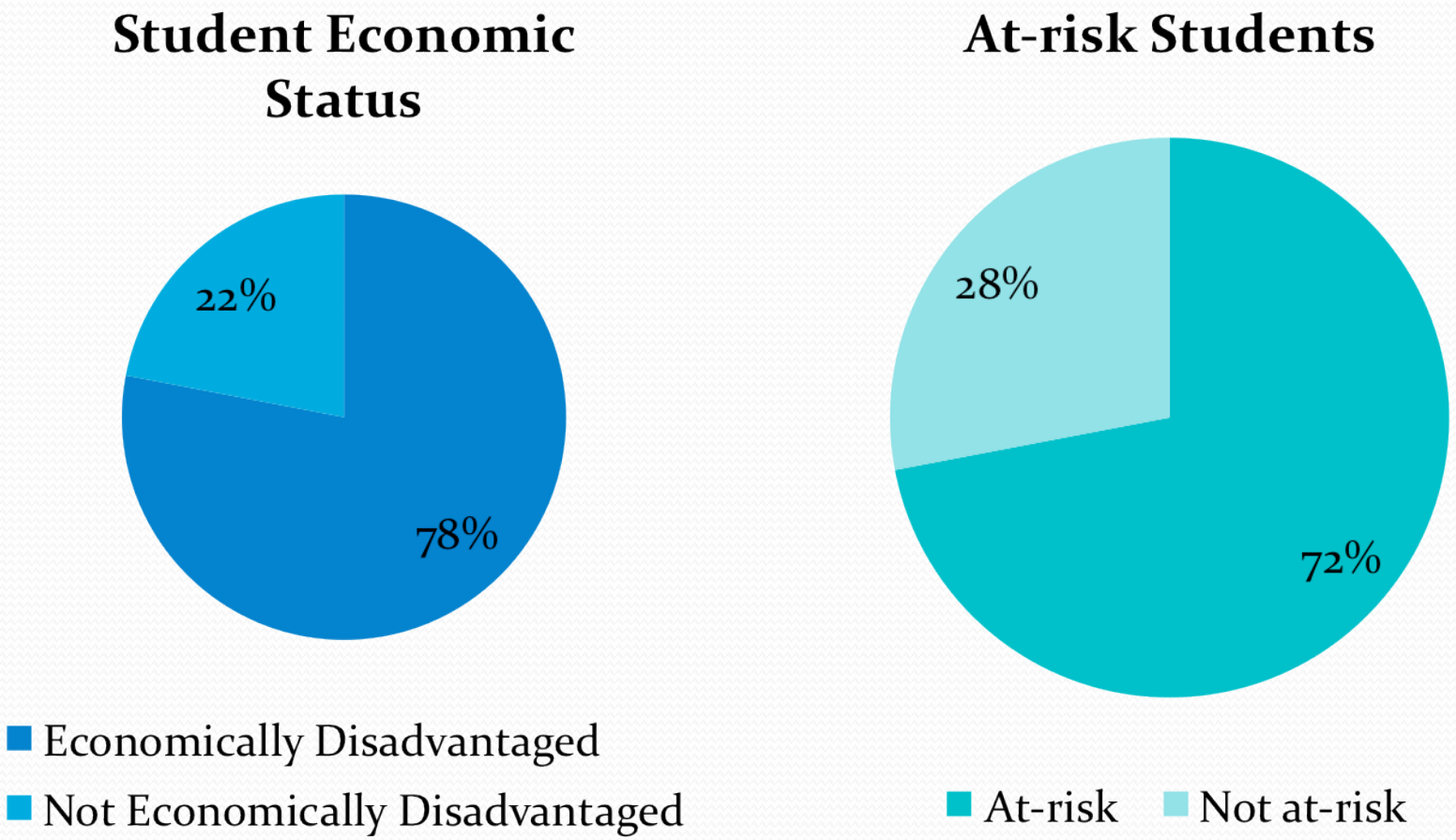
- Provide model mathematics classrooms, which demonstrate student engagement, rigorous learning opportunities, and the effective use of technology

Eisenhower Demographics

- Total Students: 1852
  - 10th Grade: 694
  - 11th Grade: 632
  - 12th Grade: 526



Eisenhower Demographics



Exploring Functions and other Mathematical Concepts

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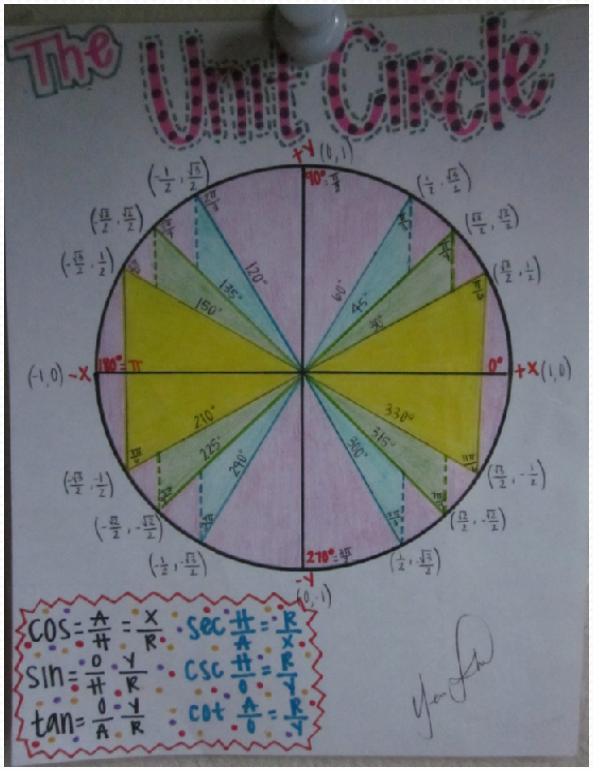
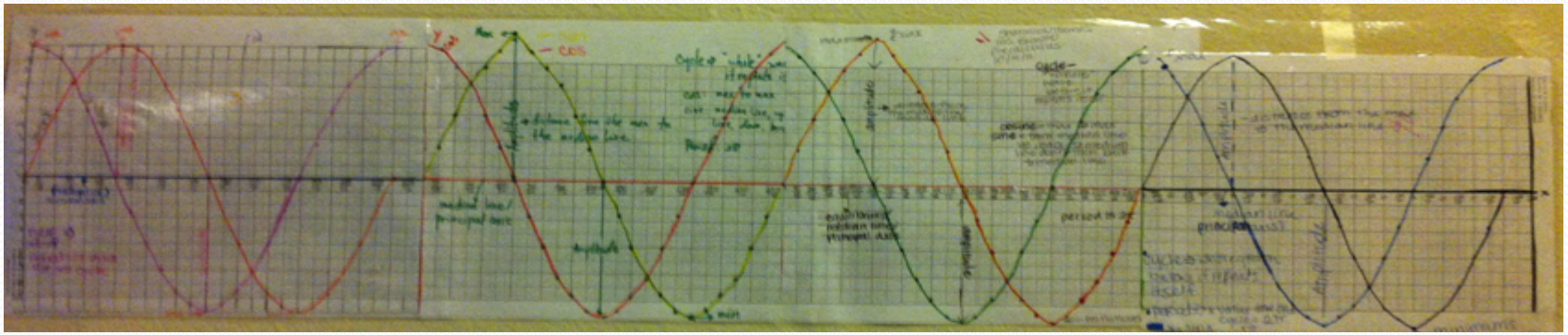
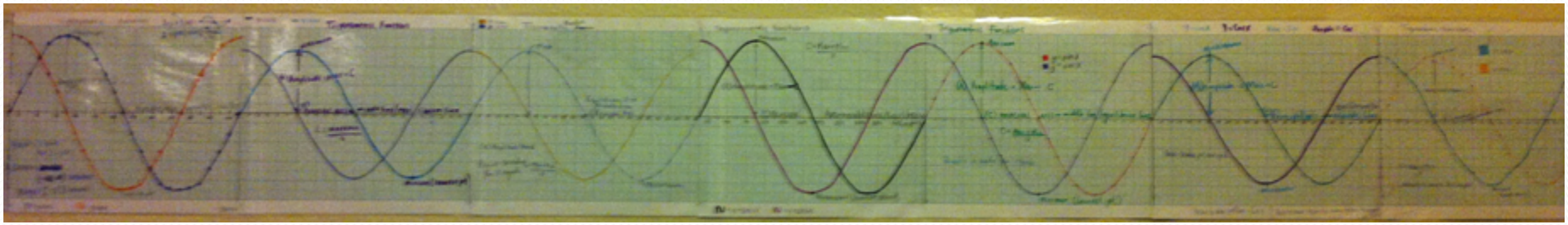
Exploring Trigonometric Functions

- The Unit Circle



Graphing $y = \sin x$ and $y = \cos x$





Graphing_Sine_Cos
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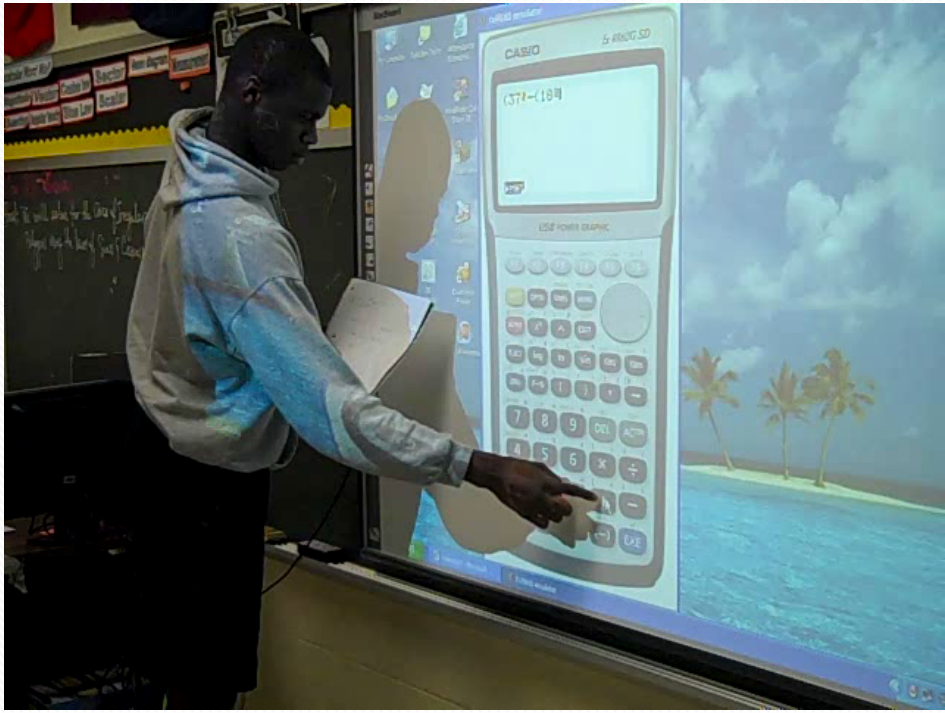
Writing Trig Equations given graphs.

- When do I use the calculator?



UofHGraphsSinCos

http://www.online.math.uh.edu/Math1330/ch5/s52/index.html

Exploring the functions, $y = \sin x$, & $y = \cos x$ with a rolling hula-hoop.

Exploring Trig Functions

MonthlyTemperatures

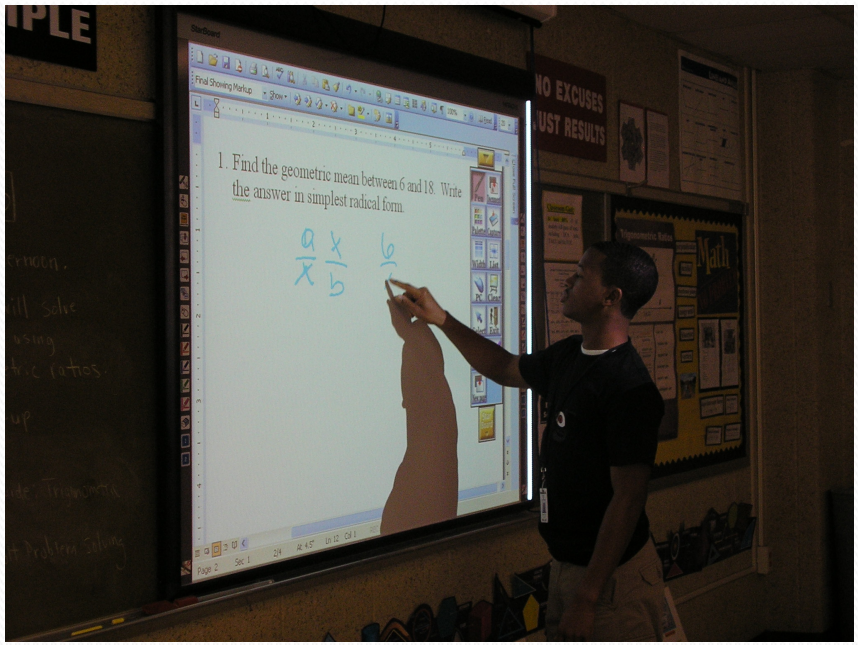
Incorporating the Internet

- Research Skills
- Data collection
- Students learn to search and use software they have not used before.

Solving word problems on Trigonometric Functions. (IB) about the clock.

Clock Problem

Applications of Trig Functions



Transforming the unit circle into the graphs of

$y = \sin x$ & $y = \cos x$.

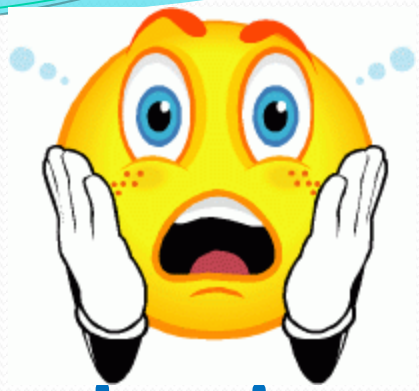
Unexpected (Great) Outcomes from the lesson

- More concepts are explored, i.e. Cycloids
- More extension projects, i.e. sound, music (differentiated curriculum)
- More collaboration that leads to more independence
- Increased appreciation of more rigorous math content

Suggestions for incorporating exploratory lessons

- Do not feel compelled to revise your entire curriculum
- Just add it in.
- Students discover how concepts are interrelated and connected into a one big whole.
- *Relevance* is Theory translated into practice.
- *There's nothing like learning while having fun!*

What about worksheets?!



QR coded problems with scavenger hunt.

Trig Exercises

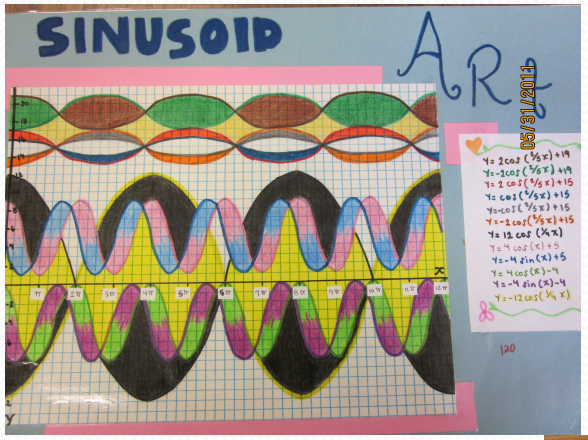
QRCodes

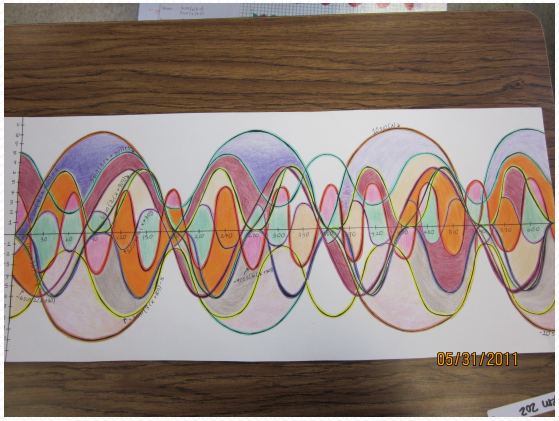
How to generate QR code for trigonometric functions?

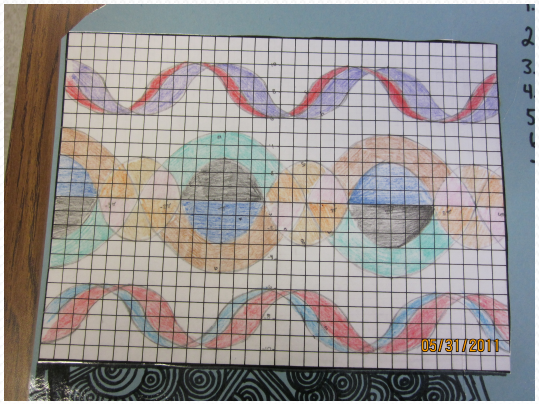
http://qrcode.kaywa.com/

Mathematics concepts turned into beautiful art work!

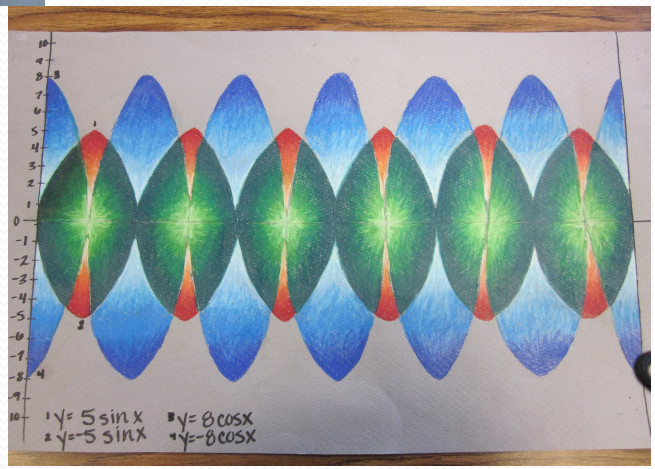
- Getting students to learn to graph trig functions

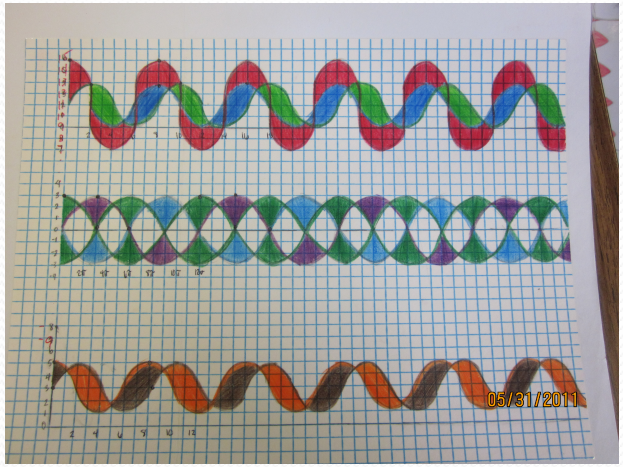






Trig Functions Art





Ultimate Purpose of Teaching

The ultimate purpose of teaching is to equip the students with the skills and the desire to explore and investigate their world so they can be truly effective and efficient human beings.

Thank you.

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This presentation is available on:
www.epsilen.com/dgbrowne

Resources

- District Coordinator, AISD
- Precalculus with Trigonometry Functions and Applications, Paul A. Foerster. Addison-Wesley, © 1993, USA
- Mathematics for the international student. Mathematical Studies SL, Mal Coad, etc. Haese & Harris Publications, © 2004, Australia
- http://www.online.math.uh.edu/Math1330/ch5/s52/index.html
- http://qrcode.kaywa.com/