

# Providing Professional Development to Meet Common Core State Standards

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Maryland Council of Teachers of Mathematics

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# Session Outcomes

- Examine strategies for providing effective teacher development in the Common Core era.
- Discuss a vision for large-scale, collaborative and innovative model for improving teaching and learning mathematics.



# How can we ensure...

## The PRIME Leadership Framework

Principle	Indicator 1	Indicator 2	Indicator 3
<b>Equity Leadership</b>	Every teacher addresses gaps in mathematics achievement expectations for all student populations.	Every teacher provides each student access to relevant and meaningful mathematics experiences.	Every teacher works interdependently in a collaborative learning community to erase inequities in student learning.
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<b>Assessment Leadership</b>	Every teacher uses student assessments that are congruent and aligned by grade level or course content.	Every teacher uses formative assessment processes to inform teacher practice and student learning.	Every teacher uses summative assessment data to evaluate mathematics grade-level, course, and program effectiveness.

...through high quality, effective teacher development (ETD)?

# Discuss

- What are some of your successes, challenges, lessons learned related to providing and/or participating in teacher development?



# Our Story: A Sampling of Past Professional Development Approaches

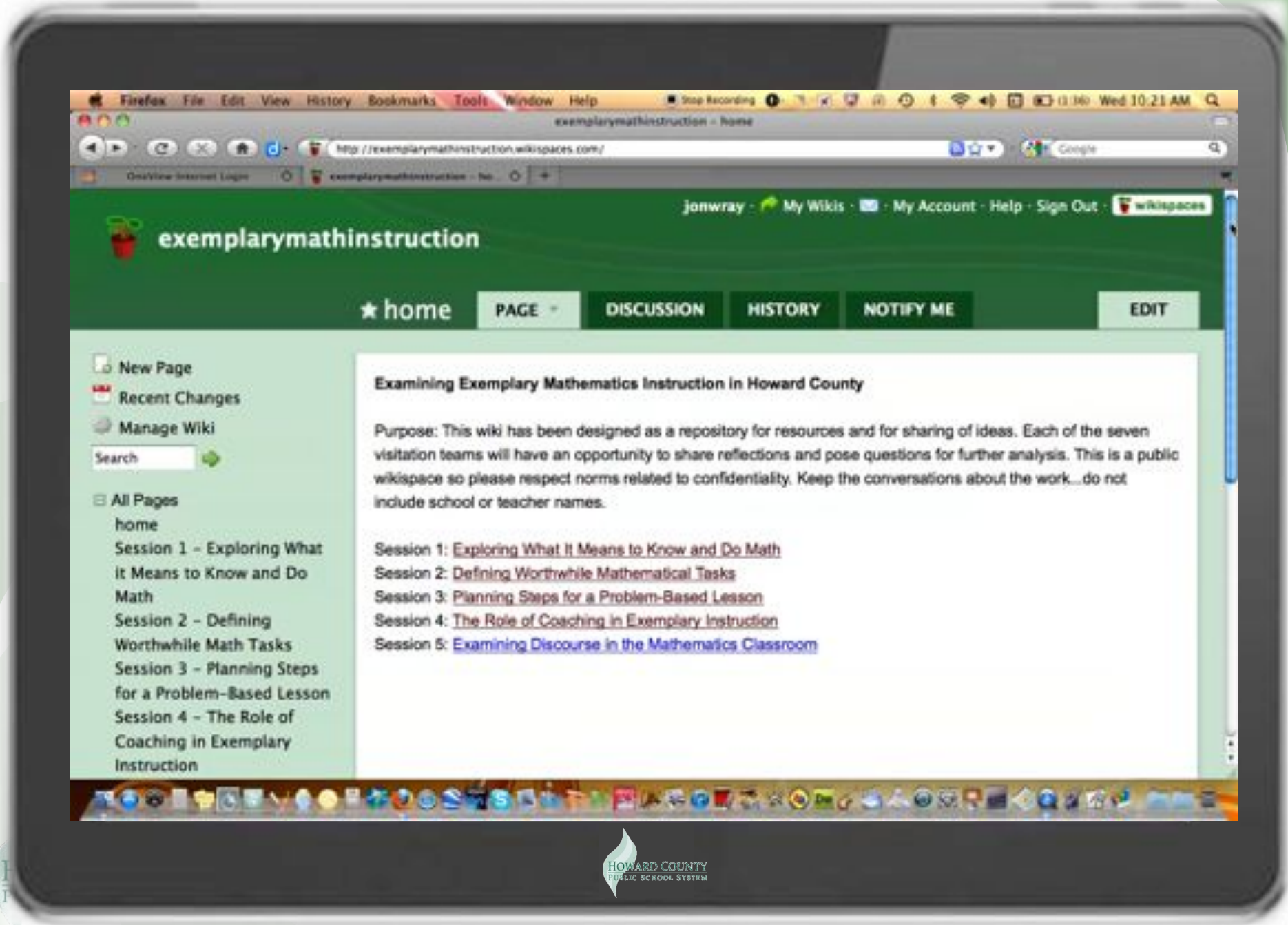
- Teacher development
- Instructional leadership development
- Parent and student development

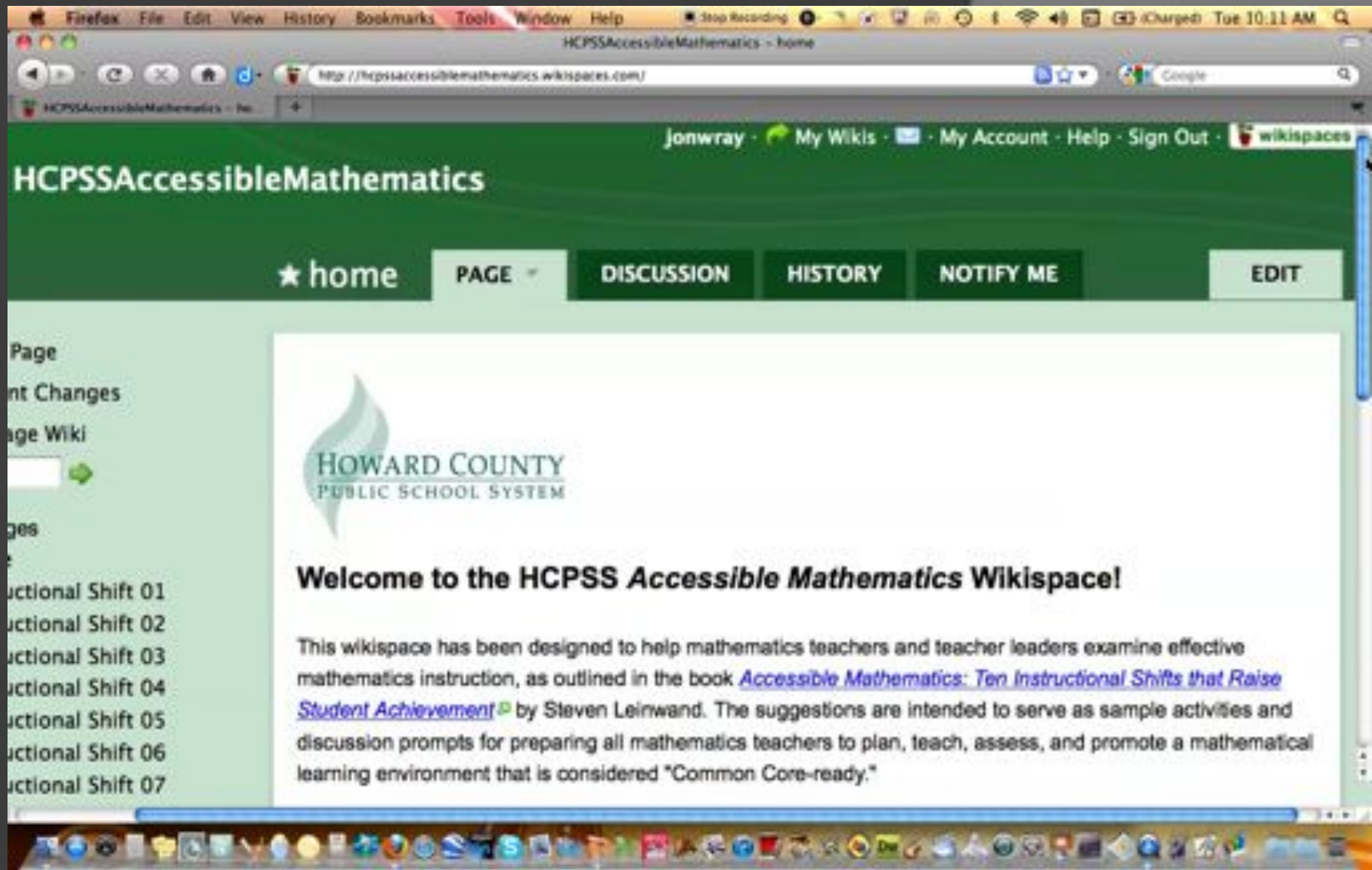


# Standards for Teaching and Learning

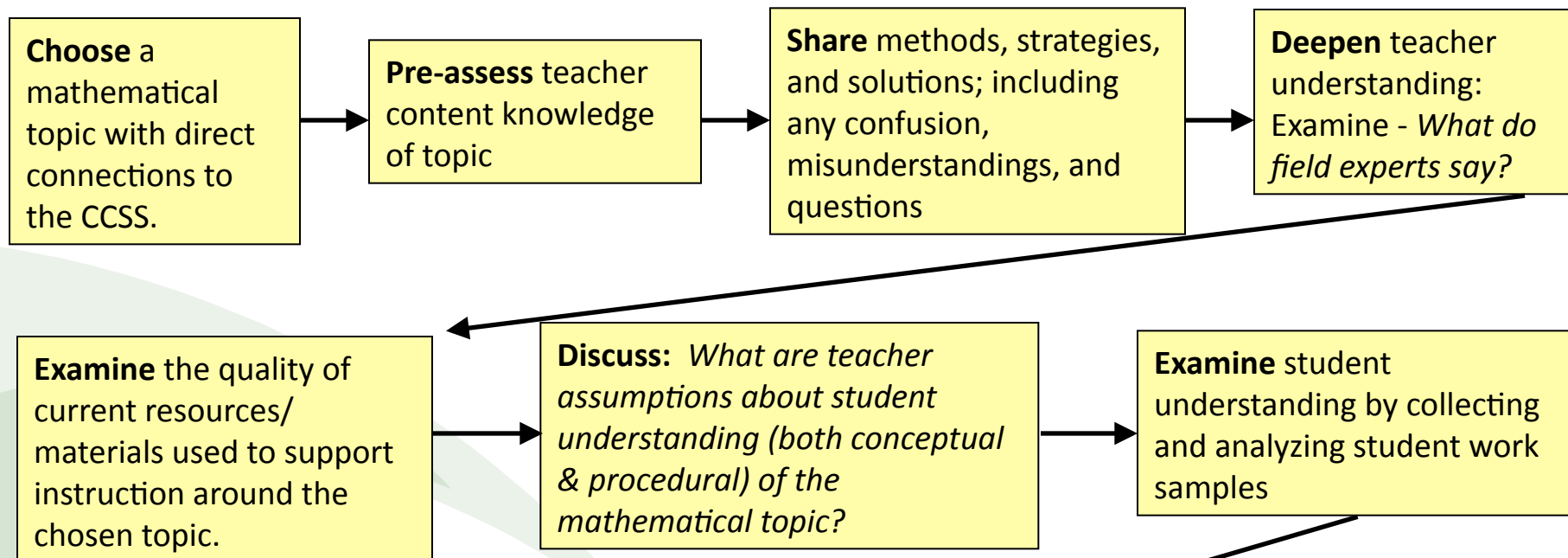
- **Standard 1:** Knowledge of Mathematics & General Pedagogy
- **Standard 2:** Knowledge of Student Mathematics Learning
- **Standard 3:** Worthwhile Mathematical Tasks
- **Standard 4:** Learning Environment
- **Standard 5:** Discourse
- **Standard 6:** Reflection on Student Learning
- **Standard 7:** Reflection on Teaching Practice

http://exemplarymathinstruction.wikispaces.com





# A Teacher Development Prototype Process



**Based on deepened understandings, teachers will design, and revise** worthwhile mathematical tasks, lessons, lesson seeds, and formative/summative assessment items that:

- engage teachers'/students' intellect;
- develop mathematical understandings and skills;
- stimulate students to make connections and develop a coherent framework for mathematical ideas;
- call for problem formulation, problem solving, and mathematical reading;
- promote communication about mathematics;
- represent mathematics as an ongoing human activity; and
- display sensitivity to, and draw on, students' diverse background experiences and dispositions (NCTM, 2007).

# Just like *mathematics*, the prototype should include *multiple means of...*

## **Representation**

The content is represented in multiple ways including text, audio clips and video.

## **Action and Expression**

Online activities, discussion questions and tasks allow users to express their understanding in different ways.

## **Engagement**

Text, audio, video, activities, additional resources, information, and links to other web sites allow students multiple ways to engage with the content.


QuickTime Player File Edit View Share Window Help Stop Recording Thu 10:45 AM

Developing Strategies for Fraction Computation: Multiplication and Division

http://www2.hcpss.org/math/FractionPrototype/index.html

Most Wanted - Curricular Programs Leadership Issues M... Getting Started Latest Headlines 76 Conducting CTIP - 5 Networks Web Based Loyola Notre Dame L... Blackboard Academ...

Developing Strategies for Fract... Post your instructional suggest...



## Developing Strategies for Fraction Operations Multiplication and Division

Developed by the HCPSS Office of Secondary Mathematics

HOWARD COUNTY  
PUBLIC SCHOOL SYSTEM

### Introduction

*How do your students solve a problem such as  $\frac{3}{4} \div \frac{1}{2}$ ?*

*How do you typically solve this problem?*

Like many, your earliest memory of learning about division of fractions might have included the rhyme:

*Ours is not to reason why; just invert-and-multiply.*

Eventually, someone may have instilled the basic principle that *dividing by any [fraction] number is the same as multiplying by its reciprocal*. We can routinely apply these procedures to solve rote problems. **However, are these "understandings" good enough for our students to develop mathematical proficiency?**

Furthermore, if you were asked to use a *non-numeric approach* versus the invert-and-multiply algorithm for solving  $\frac{3}{4} \div \frac{1}{2}$ , could you accurately represent and explain your solution(s)? Would your solution(s) model the meaning of the

### Quick Links

Introduction

Overview

**Session 1: Developing the Concept of Multiplication of Fractions**

- Fractions of Whole Numbers
- Unit Parts without Subdivisions
- Subdividing the Unit Parts
- Area (Regional) Model

**Session 2: Developing the Multiplication Algorithm**

- Factors Greater Than One
- Methods


**Session 3: Partitive Interpretation of Division**

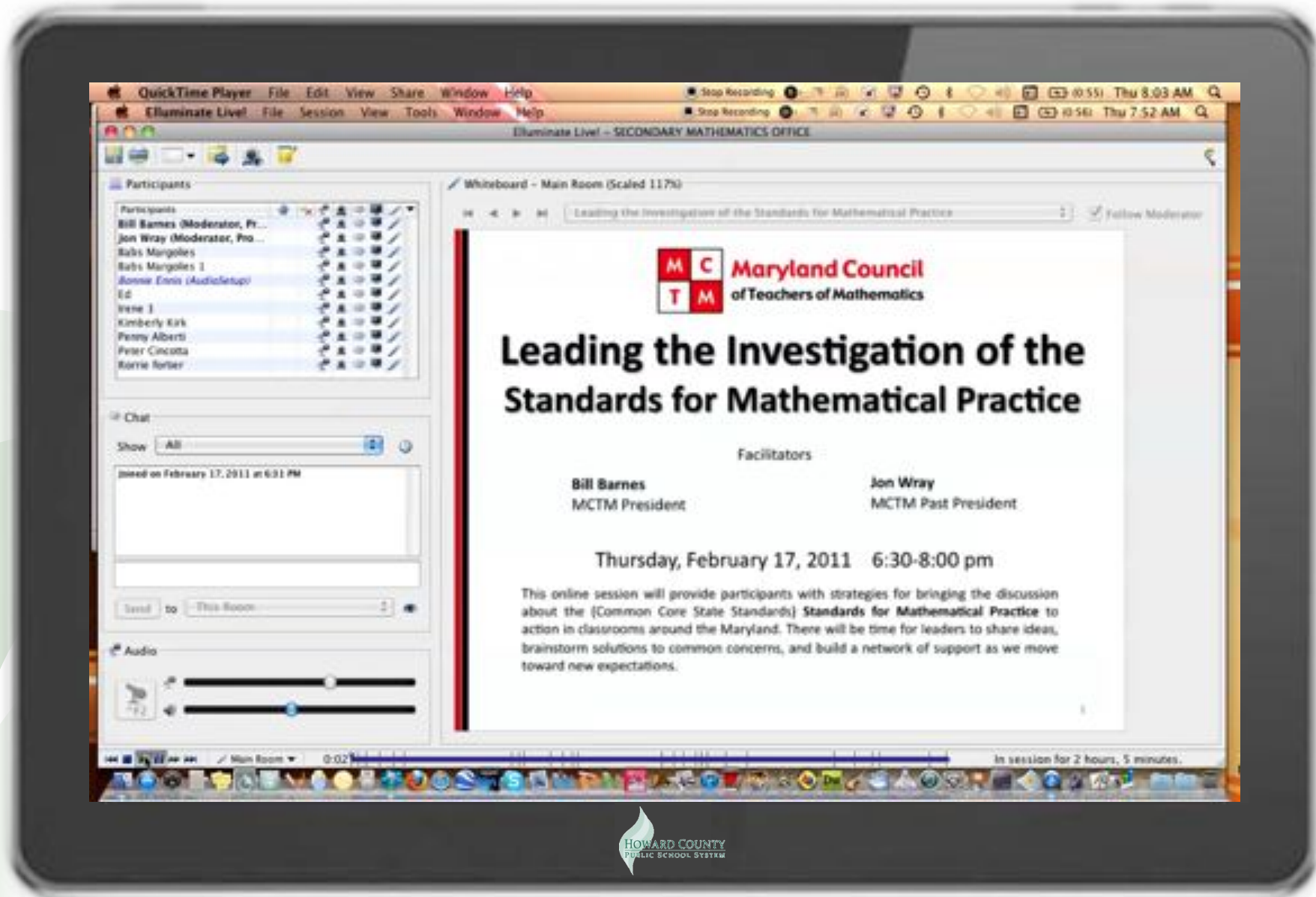
- Whole Number Divisors
- Fractional Divisors

**Session 4: Measurement Interpretation of Division**

- Repeated Subtraction or Equal Groups

Done



# To what degree does your current teacher development model result in improved (and sustained) teaching and learning?



Text a **CODE** to **22333**

High impact	<b>171827</b>
Medium impact	<b>171828</b>
Low impact	<b>171834</b>
No impact	<b>171835</b>
PD? Who has MONEY for PD?!	<b>171836</b>

# Effective Teacher Development (ETD)\*

## Setting the Stage

- *What is your ETD plan for transforming teaching and learning in the mathematics classroom?*
- *How do or will you measure its impact? (Outcomes related to student achievement)*
- *How do your resources support the larger scope of [future] available curriculum tools and resources?*

\*S. Leinwand (2011)





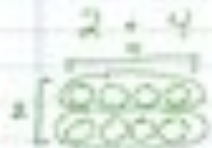
In a world where Twitter, facebook, YouTube, and other social networks are driving the acquisition of knowledge, *how will we harness these (and other) technologies to improve teaching and learning?*

# A More Conceptual Approach?


Multiplying Binomials aka FOIL

$(x+1)(x+3)$

$2 \times 4$




$(x+1)(x+3)$



$x^2 + 4x + 3$

$10 \times 12 = (10)(10) + (10)(2)$



$100 + 20 = 120$

$x(x+3) + 1(x+3)$

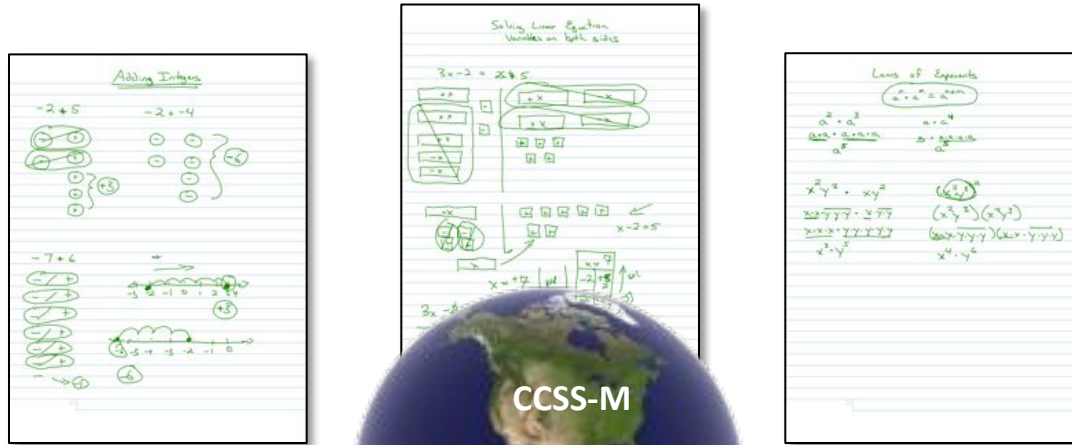
$x^2 + 3x + x + 3$

$x^2 + 4x + 3$

$(x+1)(x+3)$

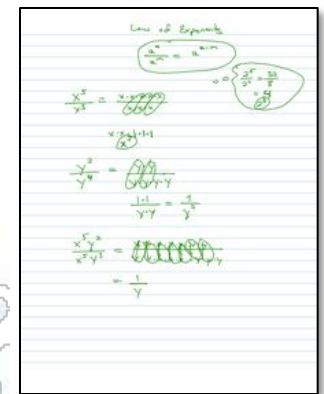
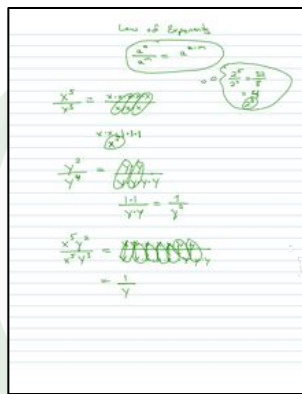
$x^2 + 4x + 3$

# A DRAFT Vision for Collaborative & Innovative ETD



Building an active, sharing learning community

Measuring the impact on student learning



Deepening teacher (and student) understanding thru ETD

*What are your ideas?*



*How do we begin to move the needle?*

# Imagine a time when...

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...through high quality, innovative, and collaborative ETD?

*Thank you!*

*For more information please contact us!*

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## HCPSS Secondary Mathematics “Look-Fors”

School \_\_\_\_\_

Teacher(s) \_\_\_\_\_

Course/Period \_\_\_\_\_

Standards & Indicators for Exemplary Instruction	Observed Behaviors / Comments
<p><b>Standard 1: Knowledge of Mathematics &amp; General Pedagogy</b></p> <ul style="list-style-type: none"> <li>• The teacher(s) demonstrate(s) a deep knowledge of mathematics content and instructional strategies for diverse learners. (2A, 2B)</li> <li>• Students effectively communicate with the teacher and their peers. (1A, 4A)</li> </ul>	
<p><b>Standard 2: Knowledge of Student Mathematics Learning</b></p> <ul style="list-style-type: none"> <li>• Students are engaged in a deep exploration of mathematics. (2A, 2E)</li> <li>• Students are participating in differentiated activities based on their readiness, interest, and/or learning preferences. (2B)</li> <li>• Students use a variety of tools for mathematical investigation (e.g., appropriate use of calculators, computer, manipulatives, etc.). (2D, 2E, 4C)</li> </ul>	
<p><b>Standard 3: Worthwhile Mathematical Tasks</b></p> <ul style="list-style-type: none"> <li>• All students are actively engaged in rich mathematical activities (e.g., hands-on, relevant/real-world, collaboration in small groups). (2E, 4C)</li> <li>• All students are involved in tasks that lead to the learning of important mathematical concepts. (2A, 2B, 4C)</li> <li>• Students pose and/or respond to higher-order questioning using appropriate mathematical language. (4B, 4C)</li> <li>• Students are engaged in problem solving, communication, connection, reasoning and proof, representation, and inquiry-based investigations. (2E, 4C)</li> </ul>	
<p><b>Standard 4: Learning Environment</b></p> <ul style="list-style-type: none"> <li>• Students take risks and work independently and/or collaboratively to make sense of mathematics. (3A, 4B, 4C)</li> <li>• Students are working in a safe and nurturing environment where all ideas are valued. (3A, 3C)</li> <li>• Students are benefiting from an atmosphere based on respect, a sense of interdependence and sharing of mathematical ideas, and adequate time to process learning. (3A, 3C, 4C)</li> <li>• Students have opportunities to demonstrate understanding throughout the lesson. (4B, 4C)</li> <li>• Students access and are encouraged to use technology when appropriate. (2E, 4C)</li> </ul>	
<p><b>Standard 5: Discourse</b></p> <ul style="list-style-type: none"> <li>• Students clarify and/or justify their reasoning as they work within a variety of grouping structures (e.g., pairs, small groups, whole group, independently). (4B)</li> <li>• Students construct multiple representations (e.g., using a graph, using an equation, using a table, drawing and labeling a picture, using manipulatives, writing an explanation) and make connections between them. (4C)</li> <li>• Students are encouraged to share ideas, and respond to questions that engage and challenge their thinking. (4B, 4E)</li> <li>• Students participate in an appropriately paced lesson, with seamless transitions, and that is designed to meet their individual needs. (2E, 4B)</li> </ul>	
<p><b>Standard 6: Reflection on Student Learning</b></p> <ul style="list-style-type: none"> <li>• Students devise, carry out, and justify solutions. (4C, 4E)</li> <li>• Students demonstrate learning through ongoing formative and summative assessment and receive regular feedback. (2F, 4D)</li> </ul>	
<p><b>Standard 7: Reflection on Teaching Practice</b></p> <ul style="list-style-type: none"> <li>• The teacher(s) collaborate(s) with colleagues to develop and implement plans to improve instructional programs and practices. (5D)</li> <li>• The teacher(s) seek(s) to improve teaching and practice. (5A, 5E)</li> </ul>	

**Additional comments:**

Non-evaluative Visitor \_\_\_\_\_ Date \_\_\_\_\_