

Preparation Notes

Please review and customize this deck to prepare it for use. Some notes:

- These professional learning (PL) materials (slide deck and accompanying handout) are being offered in editable forms so that you may make adjustments to better support the specific work happening in your school or district.
- For the 2024–25 school year, student work samples are not provided for most sessions. The facilitator will need to collect or create student work samples when implementing these materials during 2024–25.
- These PL materials are designed to easily accommodate remote delivery:
 - A [Jamboard template](#) is provided to facilitate discussion of student work; the facilitator will need to make a copy of this and be ready to share the link with participants as noted in the deck.
 - Text that can be readily pasted (marked with “—”) into a video call chat feature is included when participants need to reference the handout.
 - There are placeholders for handout links to be shared with participants in the notes field of selected slides; the facilitator will need to add a link to the handout where indicated by “[insert link].”

M203 Overview

XQ Badge Project PL Series Baseline Session

Month XX, XXXX

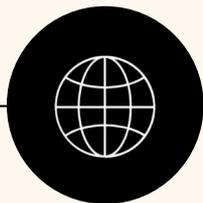


Welcome!

Community Builder:

Write a “tweet” in 140 characters or less that describes your school year so far. Get ready to share!

Outcomes and Agenda



Participants will be able to:

- Explain the content and practice expectations for the M203 badge
- Analyze tasks through the lenses of (1) content and practice expectations and (2) learning principles
- Analyze student work for evidence of learning

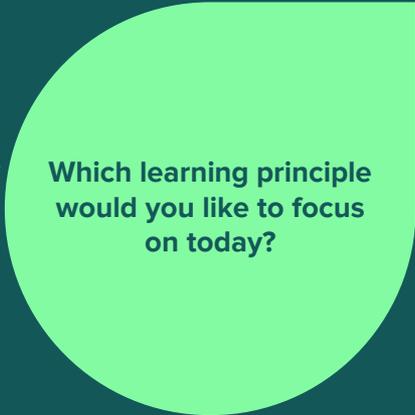


Agenda:

- Task 1: Expectations and Learning Principles
- Task 1: Student Work
- Task 2: Expectations and Learning Principles
- Task 2: Student Work
- Closing

Learning Principles

1. Engage with cognitively demanding tasks in heterogeneous settings.
2. Engage in social activities.
3. Build conceptual understanding through reasoning.
4. Have agency in their learning.
5. View mathematics as a human endeavor across centuries.
6. See mathematics as relevant.
7. Employ technology as a tool for problem-solving and understanding.



**Which learning principle
would you like to focus
on today?**

01

Exploring the Content

What comes to mind?
What knowledge and skills
should students learn to
earn this badge?



Come off mute
or put your
thoughts in the
chat!

What's the Story of these Standards?

Selected Common Core Standards for Mathematics High School – Algebra

Interpret the structure of expressions

1. Interpret expressions that represent a quantity in terms of its context.★
 - a. Interpret parts of an expression, such as terms, factors, and coefficients.
 - b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1 + r)^n$ as the product of P and a factor not depending on P .
2. Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

Perform arithmetic operations on polynomials

1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

Understand the relationship between zeros and factors of polynomials

2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a , the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.
3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

**How would you synthesize these?
What are the key takeaways
for students?**

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3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Share your thinking!

M203 Content and Practice Expectations (CPE)

203.a	Interpret the structure of polynomial and rational expressions.
203.b	Reason about and perform operations on polynomials.
203.c	Understand the relationship between the zeros and factors of polynomials.
203.d	Use polynomial identities to solve problems.
203.e	Rewrite rational expressions.
203.f	Interpret polynomial and rational functions that arise in applications in terms of the context.

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**What
resonates with
you?**

M203 Content and Practice Expectations and Indicators

Content and Practice Expectations	Indicators Choose an artifact where you...
203.a: Interpret the structure of polynomial and rational expressions.	i. interpret how parts of an expression, such as terms, factors, and coefficients relate to a real-world situation.
	ii. interpret complicated expressions by viewing one or more of their parts as a single entity.
	iii. use the structure of an expression to identify ways to rewrite it.
203.b: Reason about and perform operations on polynomials.	i. demonstrate understanding that polynomials are closed under the operations addition, subtraction, and multiplication.
	ii. add, subtract, and multiply polynomials.



What new insights do you have?

Let's Investigate

Choose at least one task to explore:

- Trina's Triangles
- Egyptian Fractions II

Which content and practice expectations are evident in each one?

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Come off mute
or put your
thoughts in the
chat! What did
you find?

What's the Same?

What's Different?

1. How do these content and practice expectations align to ways you've taught this topic before?
2. How are they different?

**Come off mute
or put your
thoughts in the
chat!**

Inequity Is our Reality

About

60%

of community college students and 40 percent of four-year students are placed into non-credit bearing developmental mathematics (Ganga et al., 2018)

Only

33%

of community college students complete the developmental math sequence. Only 20 percent complete a college-level math course over three years (Bailey, Jeong, & Cho, 2010).

We Must Lead the Movement

How can this approach give space for what math can be?

Is math...?

- About getting one right answer, the teacher's way
- Irrelevant
- About doing procedures
- Independent work
- Something my teacher made up
- Formulaic

Or could math be...?

- About using multiple strategies flexibly
- Connected to the real-world in ways that make sense
- About understanding and applying
- Collaborative work
- Lived across continents and centuries
- Novel, challenging problems

02

Task 1: Expectations and Learning Principles

Let's Do Some Math!

Example 1

Students are given a task like this:

Part 1: Make Sense

In the early 1600s, Johannes Kepler (1571–1630) studied the motions of the planets to find a good mathematical model for them. In 1619, he published his third law of planetary motion, which says how the orbital periods of the planets are related to their distances from the sun. In Kepler's time, Uranus and Neptune had not been discovered, but in the table below are data for all 8 planets.

planet	distance (millions of km)	period (days)
Mercury	57.9	88.0
Venus	108.2	224.7
Earth	149.6	365.2
Mars	227.9	687.0
Jupiter	778.6	4,331

Do the task as a student would. Jot down any reflections that you have as you do the math!

Content and Practice Expectations

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Choose 1–2 Content and Practice Expectations that student work could give evidence of.

Content and Practice Expectations

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203.f: Interpret polynomial and rational functions that arise in applications in terms of the context.

Learning Principles

In M203 Polynomial and Rational Expressions, Functions, and Equations, students will employ the following learning principles:

- Engage with cognitively demanding tasks in heterogeneous settings (LP 1).
- Engage in social activities (LP 2).
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- See mathematics as relevant (LP 6).
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Which of these principles does this task lend itself to? Which ones can the task be easily adapted to accommodate?

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**Share what
you came up
with!**

03

Task 1: Student Work

What is the impact of our labels?

“Any kind of qualifier can be harmful because who we are is not static. Our abilities are constantly changing...I know if I was raised in this day and age, I would have been labeled a struggling reader. But what I know now is I was actually reading like a writer. I was reading slowly and deliberately and deconstructing language, not in the sense of looking up words in the dictionary, but understanding from context. I was constantly being compared to my sister who excelled, and it made me feel insecure. What gets translated is 'you are not as good,' and that gets translated into our whole bodies. That's where the danger lies.” – Jacqueline Woodson

Round 1: What do you notice?

Jot down

- One thing you notice about each piece of student work.

Insert image of student work here

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**Come off mute
and share what
you saw!**

Insert image of student work here

Criteria for Success

Conference and Provide Revision Support	Accept with Revision	Accept
<p>The student's artifact shows an emerging understanding of the expectations of the indicator(s). After conferencing and additional instruction/learning, the student may provide a revised or different artifact as evidence of the indicator(s).</p>	<p>The student's artifact is approaching a full understanding of the expectations of the indicator(s). The artifact may contain execution errors that should be corrected in revision. The student may revise the selected artifact or submit a different artifact.</p>	<p>The student's artifact demonstrates evidence that they have met the expectations of the indicator(s).</p>

What resonates with you? What questions surface for you?

Humanizing Assessment

The criteria for success promote “a culture of revision and redemption that encourages students to attempt challenging work, provides continual opportunities for practice and revision, and supports students in developing the courage and confidence to work continuously to improve in their successive efforts.”

(Darling-Hammond, 2002, p.29)

Round 2: What evidence of learning is there?

203.f: Interpret polynomial and rational functions that arise in applications in terms of the context.

Let's examine some work together:

Conference and Provide Revision Support

The student's artifact shows evidence of an emerging understanding of the expectations of the indicator(s). After conferencing and additional instruction/learning, the student may provide a revised or different artifact as evidence of the indicator(s).

Accept with Revision

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Accept

The student's artifact demonstrates evidence that they have met the expectations of the indicator(s).

Examining Student Work

The image shows a digital workspace interface. At the top, there are three buttons: "Conference and Provide Revision Support", "Accept with Revision", and "Accept". On the left side, there is a vertical toolbar with several icons: a pencil, an eraser, a mouse cursor, a document icon (highlighted with a red circle and a red arrow), a photo icon, a circle icon, a text box icon, and a scissors icon. In the center of the workspace, there is a large red callout bubble with the text "Put your thoughts on the Jamboard!". In the bottom right corner, there is a red circular badge with the text "Work Sample 1".

Example #1

insert image 1 of student work

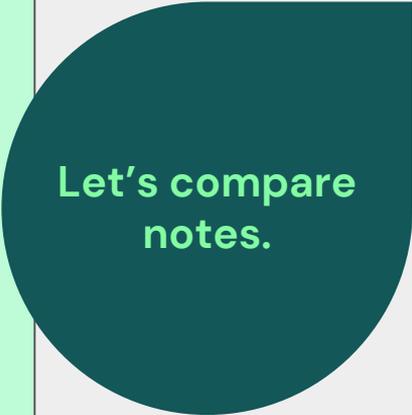
**Let's compare
notes.**

Example #2

insert image 2 of student work

**Let's compare
notes.**

Example #3

A dark teal rounded shape, resembling a quarter-circle with a flat edge on the right, containing the text "Let's compare notes." in a light green font.

Let's compare
notes.

insert image 3 of student work

Three Key Components of the Math Badging System

- Content and Practice Expectations
- Learning Principles
- Criteria for Success

Which one excites you the most?

What one will have the greatest impact on students?

What questions surface for you?

**Come off
mute or share in
the chat!**

04

Task 2: Expectations and Learning Principles

Let's Do Some Math!

Example 2

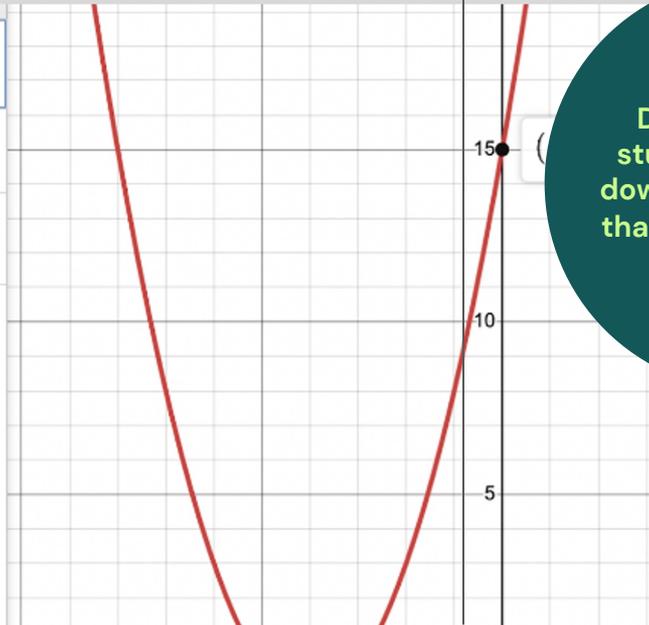
Students are given a task like this:

You have been given a polynomial graph with three equivalent equations. Analyze and make connections from the information in the questions below.

 $x^2 + 8x + 15$ 

 $(x + 3)(x + 5)$ 

 $(x + 4)^2 - 1$ 



Do the task as a student would. Jot down any reflections that you have as you do the math!

Content and Practice Expectations

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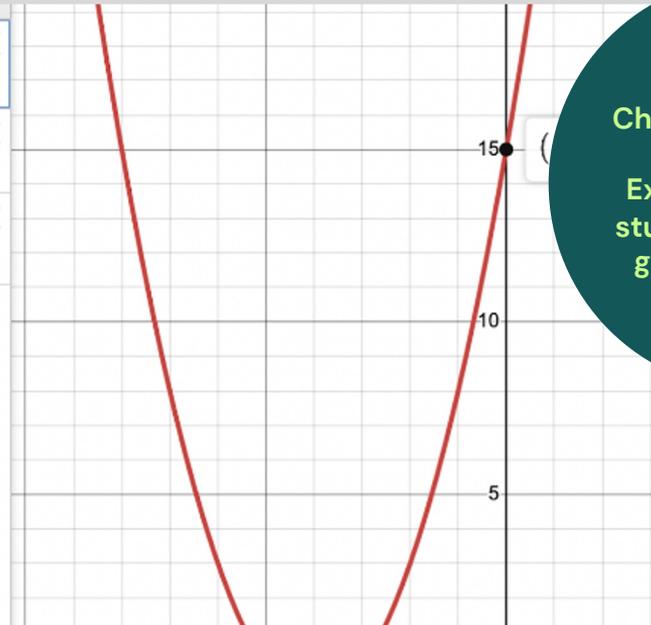
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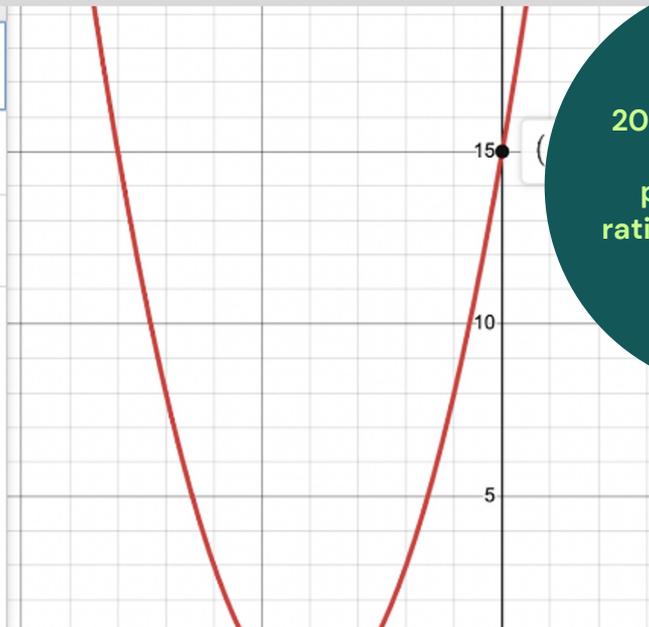
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203.a: Interpret the structure of polynomial and rational expressions.

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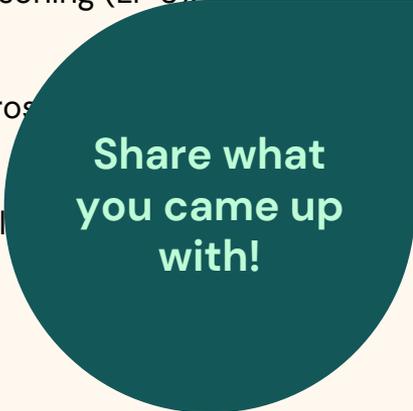
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05

Task 2: Student Work

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insert image 1 of student work

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Example #2

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Example #3

insert image 3 of student work

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Let's Hear Some Reflections

What kinds of support will students need to demonstrate evidence of learning?

Has your thinking changed at all on how to implement this task? If so, how?

**Come off
mute or share in
the chat!**

06

Closing

What Are Your Takeaways?

Choose one question to respond to:

1. Which content and practice expectation are you most excited about? Why?
2. Which learning principle are you most excited about connecting to M203 content? Why?
3. What impact do you think using a portfolio system will have on your students? Why?