

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].”

M205 Overview

XQ Badge Project PL Series Baseline Session

Month XX, XXXX

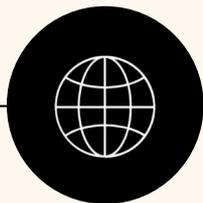


Welcome!

Community Builder:

Write a “tweet” in 140 characters or less to describe a moment/interaction that pushed your teaching practice. Get ready to share!

Outcomes and Agenda



Participants will be able to:

- Explain the content and practice expectations for the M205 badge
- Analyze tasks through the lenses of (1) content and practice expectations and (2) learning principles
- Analyze student work for evidence of learning

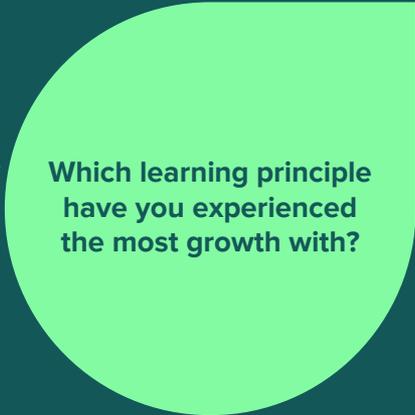


Agenda:

- 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
have you experienced
the most growth with?**

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 – Trigonometric Functions

Extend the domain of trigonometric functions using the unit circle

1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

Model periodic phenomena with trigonometric functions

5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ★

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

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5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ★

Share your thinking!

M205 Content and Practice Expectations (CPE)

205.a	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
205.b	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers.
205.c	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
205.d	Analyze trigonometric functions using different representations.
205.e	Use trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

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205.d	Analyze trigonometric functions using different representations.
205.e	Use trigonometric functions to model periodic phenomena with specified amplitude, frequency, and phase.

**What
resonates with
you?**

M205 Content and Practice Expectations and Indicators

Content and Practice Expectations	Indicators Choose an artifact where you...
205.a: Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	i. use the definition of a radian to explain radian measure
	ii. explain what an angle given with a measure in degrees would be in radians
205.b: Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers.	i. explain how radians lead to a dimensionless number that makes it possible to extend the domain of trig functions
	ii. use the unit circle to justify the value of sine, cosine, or tangent for an angle that is greater than 90 degrees



What new
insights do you
have?

Let's Investigate

Choose at least one task to explore:

- Bicycle Wheel
- Foxes and Rabbits 2

Which content and practice expectations are evident in each one?

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- Bicycle Wheel
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Which content and practice expectations are evident in each one?

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

“And by 2018, problems with the pipeline through math courses and tests were persisting. Despite the implementation of new state standards and tests, just 31 percent of students were meeting or exceeding standards in math, compared with 56 percent in English.” (Daro & Asturias, 2019)

Source: <https://justequations.org/resource/branching-out-designing-high-school-math-pathways-for-equity>

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!

Draw a circle on a coordinate plane centered at $(0,0)$ with a radius of 1. This is called a unit circle.

What is the circumference of the circle?

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

Content and Practice Expectations

Draw a circle on a coordinate plane centered at $(0,0)$ with a radius of 1. This is called a unit circle.

What is the circumference of the circle?

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

Content and Practice Expectations

Draw a circle on a coordinate plane centered at $(0,0)$ with a radius of 1. This is called a unit circle.

What is the circumference of the circle?

205.a: Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

Learning Principles

In M205 Badge Title, 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?

“The history of classifying people by intelligence and ability is inextricably intertwined with the eugenics movement and anti-egalitarian ideas, structures, and practices (Oakes et al., 1997). Given these roots, it should not be surprising that ability labels continue to be applied in ways that reflect and reproduce social hierarchies based on race, gender, dis/ability, language, and class (Martin 2009). ...

This matters at the level of broad social organization (e.g., representation in STEM fields) and at the scale of individual students and their access to opportunities, resources, and identities as learners and doers of mathematics as valuable and valued members of our society.”

–National Council of Teachers of Mathematics

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
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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

To cultivate student voice, we must first feel a sense of agency as educators. We have to free our minds from the persistent narrative that test scores and even grades tell a legitimate story about our students' success. We have to free our own learning spirits to be bold and experimental – to try pedagogical approaches that feel new, edgy, and perhaps uncomfortable. We have to be willing to flip our pedagogy and instructional leadership to center student and teacher voices, just as we flipped the dashboard to center street data. This requires that we recognize the features of a pedagogy of compliance that still operate inside many classrooms and professional-learning spaces.

Source: Safir, Shane, and Jamila Dugan. *Street Data: A Next-Generation Model for Equity, Pedagogy, and School Transformation*. Corwin, 2021.

Round 2: What evidence of learning is there?

205.a: Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

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

The student's artifact shows evidence of 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.

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 for reviewing student work. 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 small red circle containing the text "Work Sample 1".

Example #1

insert image 1 of student work

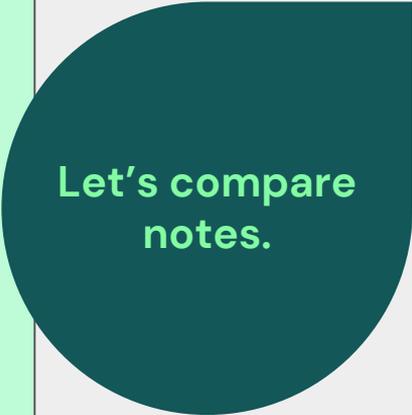
**Let's compare
notes.**

Example #2

insert image 2 of student work

**Let's compare
notes.**

Example #3

A dark teal rounded shape, resembling a quarter-circle or a teardrop, positioned on the left side of the slide.

**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?



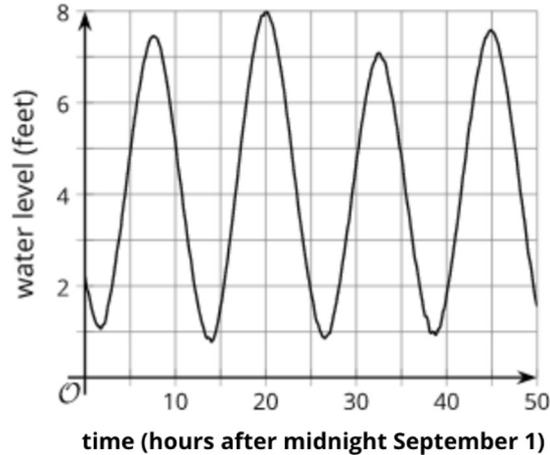
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mute or share in
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04

Task 2: Expectations and Learning Principles

Let's Do Some Math!

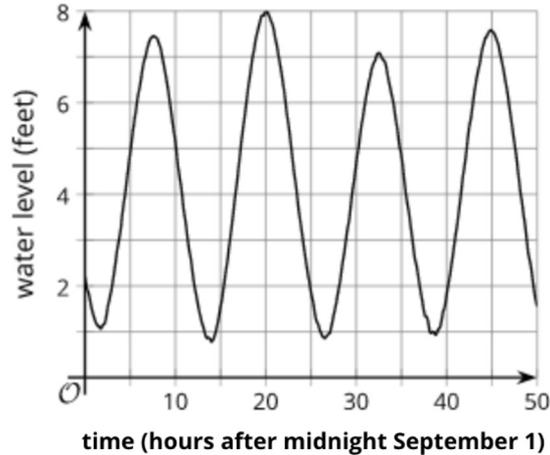
Have you ever gone to the beach on a summer day and seen a yellow flag on the shore? This flag is an indication of moderate surf signaling that the tides may be high and swimmers should be cautious when entering the water. Oceanographers are people who research and study the different conditions of the ocean. One important job of oceanographers is to study the waves, currents, and tides. These reports on ocean activity help us to know when the ocean is safe and allowed to be open to the public for activities such as fishing, boating, and swimming.



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

Content and Practice Expectations

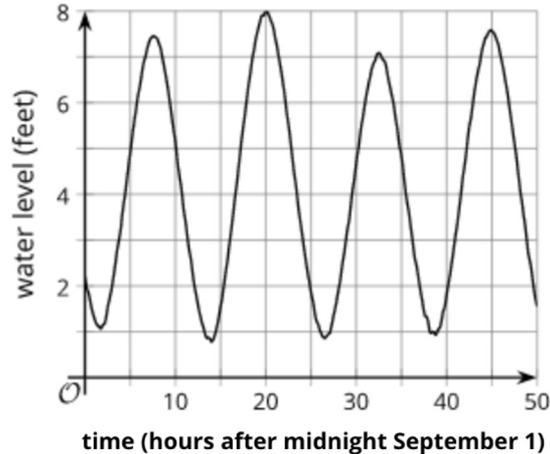
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205.d: Analyze trigonometric functions using different representations.

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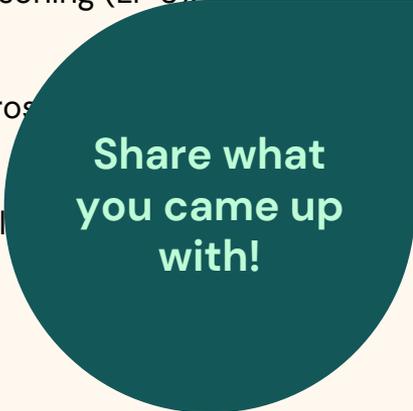
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05

Task 2: Student Work

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Example #2

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**Let's compare
notes.**

Example #3

insert image 3 of student work

**Let's compare
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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 M205 content? Why?
3. What impact do you think using a portfolio system will have on your students? Why?