

The **italicized** script provides direction for the presenter while the plain text script is the narrative for the presenter.

**Slide 1:**     *Have Slide 1 on the screen as participants enter the room. Begin by introducing yourself and a bit of background on your job, role, and engagement with PA Common Core.*

**Slide 2:**     This is one of five modules designed to assist educators in understanding and transitioning to PA Common Core. Today we will explore the standards for mathematical practice to build a basic understanding of the mathematical practices and the need for continued professional development to fully implement the Standards for Mathematical Practice for all students in every classroom.

**Slide 3:**     *Remind participants to sign on to SAS and complete and display their name tents.*

**Slide 4:**     ***Review the Essential question of the Module:***

- What are the Standards for Mathematical Practices and how do they relate to the PA Common Core?
- Can the characteristics of a student and classroom that exemplify mathematical practices be identified and implemented?

**Slide 5:**     Watch and discuss the Dan Meyer video  
<http://www.youtube.com/watch?v=SjsfHTuZ14w>  
Click on the icon to view the video.

**NOTE: If you have time to extend the presentation:**

A scale drawing of a very small object is larger than the object.  
The scale of the drawing is 2 cm: 14 mm. Find the unknown measure (in cm).  
width of object = 70 mm; width on drawing =?

Use Dan Meyer's problem example.

Take a drawing and scale it for a mural.

What content standard is addressed (comparing fractions, ratios, proportion, scale drawing)?

What practices standard(s) is addressed in your problem?

Take this traditional problem and change it to a problem that addresses both content and practice?

How?

Why would you want to change the problem?

**Slide 6:**     ***Review the expected outcomes for this session.***

Today we will explore the Standards for Mathematical Practice

Identify characteristics of a student and classroom that exemplifies mathematical practice

The purpose of this session is to build awareness and begin answering these questions:

What are the Practices?

What does a student who is using these practices look and sound like?

What learning opportunities are students experiencing to be proficient with all Practices? (*Student-Content interaction, teacher-content interaction and teacher-student interactions.*)

How do these standards go hand in hand with the content standards to bring rigor and relevance to the study of mathematics?

**Slide 7:**     A set of common standards is important. However, instruction and what students are doing in the classroom are key to success. Before we look at the mathematical practices please list the words and/or phrases that you think describe such a classroom. Work in your group and please put those words or phrases on the chart paper.

***Give about 5 minutes for groups to do this activity. Individuals or one member of a group can post their words and/or phrases on the chart paper posted for All participants to see. Give the participants a chance to read the completed list.***

Are there any words and/or phrases you would like to add?

***Take a moment for whole group to think about the list and add anything that is missing. Additions to the list will be made periodically and reflection on the list will occur later when examining the practices.***

**Slide 8:**     ***Read the following:***

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education.

*Common Core State Standards for Mathematics, page 6*

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**Module 3: Mathematical Practices**

The development of the standards for mathematical practice was based on ideas from two publications: NCTM's *Principals and Standards for School Mathematics* and the National Research Council's *Adding It Up*.

***Remind participants of the vital nature of the Standards for Mathematical Practice with respect to students developing a powerful set of core mathematical competencies.***

These practices do not stand alone and are not intended to be taught as stand-alone lessons. They are an integral part of learning and doing mathematics and need to be taught with the same intention and attention as mathematical content.

**Slide 9:** "NCTM's *Principals and Standards for School Mathematics* included a set of "process standards:" problem solving, reasoning and proof, communication, representation, and connections. Many of you may be familiar with these process standards."

**Slide 10:** The National Research Council's *Adding It Up* includes five strands of Mathematical Proficiency.

**Conceptual Understanding:** Comprehension of mathematical concepts, operations, and relations.

**Procedural Fluency:** Skill in carrying out procedures flexibly, accurately, efficiently, and appropriately.

**Strategic Competence:** Ability to formulate, represent, and solve mathematical problems.

**Adaptive Reasoning:** Capacity for logical thought, reflection, explanation, and justification.

**Productive Disposition:** Habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy.

The Mathematical Practices are intertwined with the Common Core Standards and neither should be taught separately from one another.

**Slide 11:** Using the process standards and the five strands of mathematical proficiency, the writers of the Common Core for Mathematics developed eight Standards for Mathematical Practice. An important note about these standards is that they are for students. The purpose of the Mathematical Practices is to help the students know and understand the core standards at a deeper level. They engage the students in the content of your course. While they have implications on teachers and their instruction, in and of themselves, they are not goals for teachers.

**Slide 12:**      ***Distribute Handout B: Mathematical Practice Grouping Chart***

Bill McCallum, one of the writers of the Common Core State Standards for Mathematics, described grouping the mathematical practices into four general categories:

Reasoning & Explaining (practice 2 & 3).

Modeling Using Tools (practice 4 & 5).

Seeing structure and generalizing (practice 7 & 8).

Read the first three words for each mathematical practice.

What do you notice?

***Allow several minutes for participants to work and then ask,***

What do you notice?

What are the phrases and words you listed earlier that describe these practices?

***Lead discussion to help clarify what these practices look and sound like in the classroom as students become proficient in all of the practices. These areas would not be expected every day; however, as often as appropriate for the tasks and as needed for students to be proficient in all practices.***

**Slide 13:**      Read the first three words for each mathematical practice.  
What do you notice?

***Allow several minutes for participants to work and then ask,***

What do you notice?

What are the phrases and words you listed earlier that describe these practices?

***Lead discussion to help clarify what these practices look and sound like in the classroom as students become proficient in all of the practices. These areas would not be expected every day; however, as often as appropriate for the tasks and as needed for students to be proficient in all practices.***

**Slide 14:**      The word rigor may have come up in your discussions about the mathematical practices. Mathematical rigor is an elusive term with multiple meanings. To a pure mathematician, rigor is a mark of excellence. To some K-12 educators and many parents “rigorous” often means difficult as in AP Calculus is rigorous.

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In your group discuss any additional statements that could be placed in this chart.

**Slide 15:** We will use Button Task to explore the CCSS Content and Practice Standards. First we will do the task and discuss it, and then we will look to see how a teacher used this task in his fifth grade.

***Pass out copies of the Button Task to teachers.***

***Consider modeling the pattern on a document camera with counters as you preview the four questions, and then move to the next slide for directions on how to proceed with the task. Make graph paper, colored counters, or square tiles available to teachers to use as they work on the task.***

**Slide 16:** ***Have participants follow the directions on the slide, working first individually, then in pairs on the Button Task.***  
***Whole Group Discussion: Depending on available time, consider selecting two or three papers with interesting solution strategies and or representations to share with participants before you begin the discussion of question 3. Don't linger on the discussion of the task solution strategies. Remember the focus of today's session is the Standards for Mathematical Practice so save time for that part of the discussion.***

**Chart the comments from participants regarding both the mathematical content and practices needed to successfully complete the task. You may also want to push the conversation by asking which elements of the task and/or the way the task was facilitated triggered students to use specific practices.**

**Slide 17:** Source of the video is the website Inside Mathematics. Development of the website was funded by the Noyce Foundation with a grant to the Silicon Valley Mathematics Initiative in California. The Noyce Foundation and the Silicon Valley Mathematics Initiative have graciously granted NCSM permission to utilize the website for this resource.

1. First select and show approximately 2 minutes segment from the Lesson Planning video clip beginning at 3:00 and ending at 4:49. This segment shows the teacher describing the lesson he has designed and his mathematical goals are for his students. Look for notes about the teacher, his classroom, and school on the website.
2. Next, distribute the samples of student work from Learner A and Learner B provided with this package. Allow teachers to look over the two samples of student work (Learner A and Learner B) and consider the nature of mathematics content and the mathematical practices students might be engaged in as they complete this task.

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**Module 3: Mathematical Practices**

3. Next, show approximately 2 minutes segment from the Problem 2 video clip beginning at 0:00 minutes and ending at 1:50 minutes. In this segment participants will see the teacher launch the task. Next share a segment or two of students trying to make sense of the sample student work. The video segments from 3:04 to 4:40 showing two girls working on the task and another segment from 5:40 to 6:07 with two boys are nice samples. Again, the question for participants to consider as they watch the video is the nature of mathematics content and the mathematical practices students are engaged in as they complete this task.
4. Finally, show approximately 2 minutes segment from the Closure video clip beginning at 0:00 minutes and ending at 2:00 minutes. If you have a bit more time in the session you may want to play this video all the way to the end for a total of approximately 5:10 minutes. Then proceed to the focus questions on the next slide.

**Slide 18:** Learner A

**Slide 19:** Learner B

**Slide 20:** *Preview the focus questions with teachers, and then let them consider them individually before you facilitate a whole group discussion.*  
*Handout: MOD 3 Button Task packets*

**Slide 21:** *For an elementary audience you may want to show video of a 4<sup>th</sup> grade example:*  
*Click on the icon to view the video;*  
<http://insidemathematics.org/index.php/classroom-video-visits/public-lesson-number-operations/182-multiplication-a-divison-problem-4-part-c>

**Slide 22:** *For a secondary audience you may want to show video of a 9<sup>th</sup> /10<sup>th</sup> grade example:*  
*Click on the icon to view the video.*  
<http://www.insidemathematics.org/index.php/classroom-video-visits/public-lessons-properties-of-quadrilaterals/300-properties-of-quadrilaterals-tuesday-group-work-part-a?>

**Slide 23:** *Lead the following discussion:*  
What is the difference between the traditional and the integrated problem?  
What content standard is addressed (comparing fractions?)

## Transition to PA Common Core Standards

### Module 3: Mathematical Practices

What practices standard(s) is addressed (1,2,6, 4)

Could you take a traditional problem and change to a problem that addresses both content and practice?

How?

Why would you want to change the problem?

**Slide 24:**     ***Lead discussion on two questions.***

**Slide 25:**     **Review** the list created at the beginning of the session and make changes/additions to provide a reference for what a classroom engaging students in math practice may look and sound like.

**Distribute:** MOD 3 Handout MP Overview Reflections form and have a few of the participants' share responses to second part of Question 2: What actions will you take to address and overcome these challenges?

**Slide 26:**     Credits  
Thank you! I'm here for questions, feedback, concerns...