1 ☐ **Rigor in Mathematics**

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2 ☐ **Housekeeping**

- Everyone is muted
- Webinar is being recorded
- Presentation will be emailed to all registrants
- Questions
  - Type in the question box
  - Questions will be addressed at the end of the webinar
- If you are having trouble hearing the audio, please call (415) 930-5321
  - Access Code: 202-791-582

3 ☐ **Get to Know Each Other**

Use the QR Code below or go to
 https://padlet.com/cpalelis/rigorinmath

- Tell us your name, where you are, and what you teach.

- Use the plus sign to add your comment.

4 ☐ **Rigor in Mathematics**

 https://www.youtube.com/watch?v=4YiJ2J8rZyU

5 ☐ **Objectives**

Participants will be able to:
- Identify the component or components of rigor in a given standard
- Understand the three components of rigor: conceptual understanding, procedural skill and fluency, and application
- Incorporate the three components of rigor appropriately and effectively

6 ☐ **Rigor in Mathematics**

7 ☐ **What is Rigor?**

Think about a statement you have heard that uses the word rigor.

8 ☐

9 ☐ **Myths about Rigor**
- The 3 components are taught every day.
- All 3 components must be taught for every standard.
- All components are important, but _____ is the most important.
- The 3 components should be addressed separately.

10 ☐ **What components of rigor are in the Florida Standards?**

Type in your comment on our Padlet site.

11 ☐ **Rigor Component(s)**
MAFS.5.NBT.2.5
> Fluently multiply multi-digit whole numbers using the standard algorithm.

12 ☐ **Rigor Component(s)**
MAFS.5.G.2.3
> Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*

13 ☐ **Rigor Component(s)**
MAFS.912.F-IF.2.4
> For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

14 ☐ **Rigor Component(s)**
5.NF.2.6
> Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

15 ☐ **Rigor Component(s)**
912.A-APR.1.1
> 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.

16 ☐ **Conceptual Understanding**

17 ☐ **What is conceptual understanding?**
- Making sense of mathematics
- Connecting previously learned content to new learning

• Building relationships between concepts

18 **How do students demonstrate conceptual understanding?**
- Provide evidence that they can recognize, label, and generate examples of concepts
- Recognize, interpret, and apply the signs, symbols, and terms used to represent concepts
- Use manipulatives to model concepts
- Show different representations for the same problem or skill

19 **Example of Conceptual Understanding**

Question: What is 25% of 88? What strategy did you use to find your answer?

Response: I know 25% of a number is the same thing as 1/4. I found 1/4 of 88, which is 22.
25% of 88 is 22.

20 **Procedural Skill and Fluency**

21 **What is procedural skill and fluency?**
- Applying procedures accurately, efficiently, and flexibly
- Transferring procedures to different problems and contexts
- Recognizing when one strategy or procedure is more appropriate than another

22 **How do students demonstrate procedural skill and fluency?**
- Use procedures and strategies to solve problems
- Make critical judgments about which procedures or strategies are most efficient
- Analyze their own and others' calculation methods
- Extend computational fluency

23 **Example of Procedural Skill and Fluency**
Question: 23.5 x 2.3
What strategy did you use and why?

Response: I used the standard algorithm to solve because it seemed to be the quickest method.

24 **Application**

25 **What is application?**
- Solving problems in relevant and meaningful ways
- Developing critical thinking skills
- Using practiced procedures and strategies on new problems
- Applying concepts to real-world situations

26 **How do my students demonstrate application?**

- Apply appropriate skills in context
- Determine whether a solution makes sense by reasoning
- Solve real-world situations and novel problems

27 **Example of Application**

Question: A mom and daughter were making necklaces. The daughter used 6 inches of string for her necklace; the mom's necklace was 24 inches long. How does the length of the mom's necklace compare to the length of her daughter's necklace?

Response: The mom's necklace is 4 times as long as the daughter's necklace. 6 x ___ = 24. I know 6 x 4 = 24 or 4 x 6 = 24, so the necklace is 4 times as long.

28 **Implementing Rigor in Mathematics**

29 **Moving Towards Rigor**

What strategies can teachers use to increase the rigor in their lessons?
- Unpack the standards to identify the component(s) of rigor
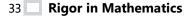- Incorporate mathematical discourse and rich questioning
- Integrate complex tasks and formative assessments throughout the lesson

30 **Unpack the Standards**

31 **Incorporate Mathematical Discourse**

32 **CPALMS Resources**
- Lesson plans
- Perspectives videos
- Tutorials
- Virtual manipulatives
- Problem-solving tasks
- Mathematics Formative   Assessment System (MFAS)

33 **Rigor in Mathematics**

34 **Questions to Consider**
- Which component of rigor is out of balance in your classroom? How will you ensure rigor in your classroom is balanced?

- What could you do to increase the rigor in your classroom?

- How can you assist your colleagues to move towards more rigorous instruction?

35 **Survey**
- Help us improve our professional development.
- Please go to https://www.surveymonkey.com/r/RWDBLWM and complete the survey.

36 **Thank you!**

- Questions

- Contact Information

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