World Class Mathematics for Parents:

What is it and what does it mean for my child?
• Standards: Why and what?

• Tackling a real problem

• Your priorities as parents

• Concepts and skills

• Concepts and Skills support Problem Solving

• Q & A
Key Questions

• What are standards? Standards are learning expectations for students.

• Why do we need new standards?

• What do they mean for a district’s mathematics program?

We will explore these questions in this session
Why have new Standards?

• Concern with:
  – disparate standards across states
  – student mobility
  – global competition
  – today’s jobs require different skills

• Governors and state superintendents pushed for the development of **common core standards** for grades K-12 in ELA and Mathematics

• Gates Foundation supported the development, involving wide consultation. They were released in 2010.
Why have new Standards?

“Talk to business leaders or university presidents or tech CEOs, and they'll say that today's graduates need to be able to
• solve real-world problems and
• engage in sophisticated forms of math thinking, not just memorize math facts.”

Main focus:

- Students in K-5 develop a solid foundation in basic conceptual understandings and procedures (with a heavy focus on number and computation)

- In the middle grades, students build on this foundation through hands-on learning in geometry, algebra, probability and statistics (with an focus on proportionality)

- High school students study advanced mathematics and apply mathematical ways of thinking to real world challenges (emphasizing mathematical modeling)
Mathematical Practice Standards

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.
Tackling a real problem
Between landing and taking off, the following jobs need to be done.

How much time is needed to get all of the jobs done?

<table>
<thead>
<tr>
<th>Job</th>
<th>Time needed</th>
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</thead>
<tbody>
<tr>
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<td>10 minutes</td>
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Doing Math - Overview

• Proficient students expect mathematics to make sense.
• They take an active stance in solving mathematical problems.
• When faced with a non-routine problem, they have the courage to plunge in and try something, and
• They have the procedural and conceptual tools to carry through.
• They are experimenters and inventors, and can adapt known strategies to new problems.
• They think strategically

(From a draft of CCSSM)
Key capabilities
What are they?
Key Capabilities

• What capabilities in general do you want your children to leave school with?

• Let’s look from a broader viewpoint, beyond just math.

• Talk with your neighbors, try to agree on your priorities, and write them down.
Key Capabilities
Key Capabilities

• How much did your school mathematics program contribute to building these key capabilities?

• How might these the “mathematical practices” in the Common Core Standards for Mathematics change that?
What do the Standards mean for a District’s Program?

• Implementing the Standards for Mathematics has meant
  – Moving some curriculum
  – Broadening and refocusing instruction
  – A greater focus on content coherence

• It has also meant
  – Daily involvement by students with the practices
  – Assessments that assess concepts, procedures, reasoning and problem solving
Concepts and Skills support each other
Choose appropriate mathematical tools

Problem solving focused math

Problem

Choose appropriate mathematical tools

Concept focused math

Mathematical topic

Illustrative Applications
Tasks for Concept Development and Reinforcement

- Classifying, naming and defining objects
- Interpreting multiple representations
  - what is another way of showing this?
- Analyzing and testing generalizations
- Exploring structure and connections
Every morning Jane walks along a straight road to a bus stop 160 meters from her home, where she catches a bus to college. The graph shows her journey on one particular day. Describe what may have happened. Is the graph realistic? Why?
Opposite Tom’s home is a hill. Tom climbed slowly up the hill, walked across the top, and then ran quickly down the other side.

Tom ran from his home to the bus stop and waited. He realized that he had missed the bus so he walked home.

Tom walked to the store at the end of his street, bought a newspaper, and then ran all the way back.

Ambiguity promotes discussion.

E.g. Can the distance from home be constant, yet Tom still be moving?
1. Tom ran from his home to the bus stop and waited. He realized that he had missed the bus so he walked home.

2. Opposite Tom’s home is a hill. Tom climbed slowly up the hill, walked across the top, and then ran quickly down the other side.

3. Tom walked to the store at the end of his street, bought a newspaper, and then ran all the way back.
Building connections is crucial

- “Knowledge, learning, understanding are not linear. They are not little bits of facts lined up in rows or piled up one on top of the other. A field of knowledge (such as mathematics) is a territory, and knowing it is not just a matter of knowing all the items in the territory, but of knowing how they relate to, compare with, and fit in with each other.

- It is the difference between knowing the names of all the streets in a city and being able to get from any place, by any desired route, to any other place.”

Tasks for Concept Development and Reinforcement

- Classifying, naming and defining objects
- Interpreting multiple representations
- Analyzing and testing generalizations
  - “always, sometimes or never true?”
- Exploring structure and connections
Always, Sometimes or Never true?

When you cut a piece off a shape you reduce its area and perimeter.
When you cut a piece off a shape you reduce its area and perimeter.
Concepts and Skills

support

Problem Solving
Show how to cut the material to make a tent like this that is big enough for two adults to sleep in. Show all your measurements clearly.
This student has chosen Pythagoras
Summary
The Standards: math lessons that teach students to

• Make sense of complex problems and persevere in solving them.
• Reason abstractly and quantitatively.
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• Model with mathematics.
• Use appropriate tools strategically.
• Attend to precision.
• Look for and make use of structure.
• Look for and express regularity in repeated reasoning.

……and so they contribute to building key capabilities.
Improving the flow of information
Now for your Questions
Thank you

<your contact email>