

Standards For Mathematical Practice

Kindergarten

October 25, 2011



Dr. John D. Barge, State School Superintendent
"Making Education Work for All Georgians"
www.gadoe.org

Welcome!

- Thank you for taking time out of your day to join in this discussion.
- You should end this session today with 3 things- something you can do tomorrow, a list of resources, something to think about.
- I need your feedback at the end of this session. Please enter feedback in the chat box once we are done.



Clearing up misconceptions:

- This webinar is not about CCGPS content, it is about using the CCGPS Mathematical Practices this year with GPS content.
- For information about how and why CCSS were developed and adopted, watch: [common core- teaching channel](#) and this: [common core- math- teaching channel](#)
- GPS is taught and tested 2011-12. CCGPS is taught and tested 2012-13.
- I will provide a list of resources at the end of this webinar.



What is learning?
What defines an effective classroom?
How do students become proficient in
mathematics?



Answers from classroom teachers

- Learning happens when a student can make connections.
- Learning happens when a student can make sense of mistakes.
- Learning happens when students can think about their thinking.
- An effective classroom is a place where students are doing the work.



Is this an effective classroom?



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How do we create a classroom environment which encourages students to take responsibility for their learning and allows them to become proficient in mathematics?

What changes and what stays the same?



CCGPS Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them
6. Attend to precision

2. Reason abstractly and quantitatively

3. Construct viable arguments and critique the reasoning of others

Reasoning and explaining

4. Model with mathematics

5. Use appropriate tools strategically

Modeling and using tools

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

Seeing structure and generalizing



- “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.”

(CCSS, 2010)

- The mathematical practices require a "re-negotiation" of the classroom contract.
- 3 Major Shifts:
 - Teachers cannot create learning-only learners can do that.
 - Increased student responsibility- from receptive to active learner
 - Teacher/student relationship shift- from adversarial to collaborative

Black and Wiliam, 2006



What needs to go away:

- Problem solving Friday
- Enrichment for the few
- Just giving the answer (teacher or student!)
- Isolation of content from process



What happens if we continue to sacrifice understanding?



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In every classroom, in every mathematical situation:

- Students must mathematize their world.
- Students must take responsibility for learning.
- Mathematics must be made explicit.

Hmmm...What does it mean to make
mathematics explicit?



Making the mathematics explicit:

- *Children* create and use graphic depictions receiving guidance and feedback from the teacher.
- Someone's reasoning is made as explicit as possible to help students *see* what another is thinking.
- Sharing ideas and strategies is paramount.
- Teacher looks for significant ideas to highlight.



Mathematizing Kindergarten

- The potential to model the situation must be built in.
- Situations must allow students to realize what they are doing. They must be able to “imagine concretely”.
- Situations must prompt learners to ask questions, notice patterns, wonder, ask why and what if.



1. Make sense of problems and persevere in solving them.

- Mathematically proficient Kindergarten students:
- Begin to build the understanding that doing mathematics involves solving problems and discussing how they solved them.
- Explain to themselves the meaning of a problem and look for ways to solve it.
- Use concrete objects or pictures to help them conceptualize and solve problems.
- Check their thinking by asking themselves, “Does this make sense?” or they may try another strategy.

6. Attend to precision.

- Mathematically proficient Kindergarten students:
- Try to use clear and precise language in their discussions with others and in their own reasoning.



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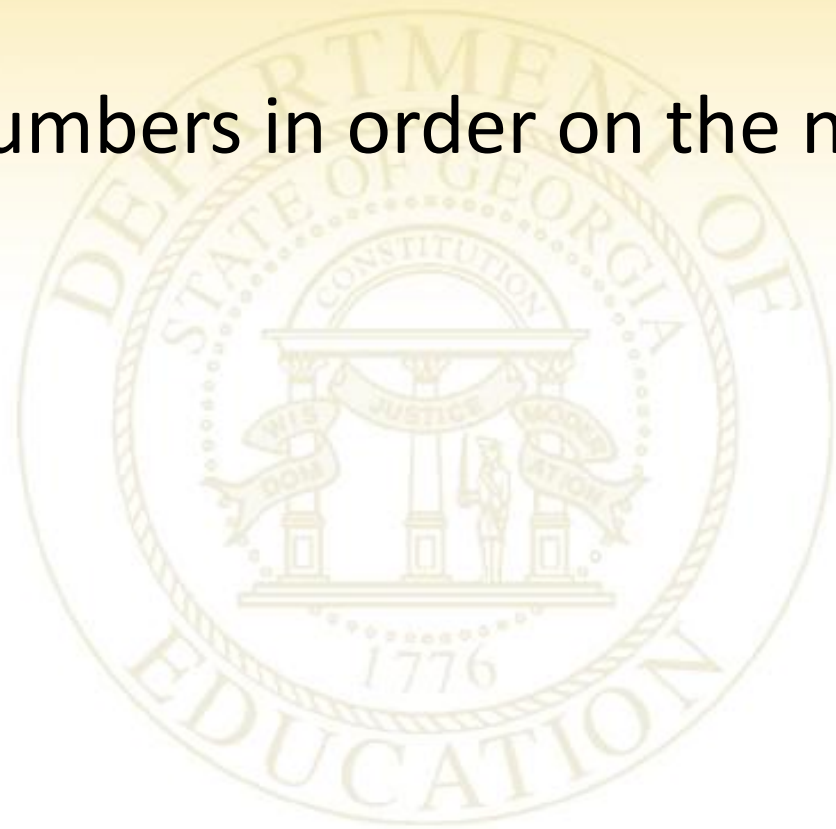


- What can we do to make sure students make sense of problems and persevere in solving them?
- How can we ensure students attend to precision?



Problem #1

Put these numbers in order on the number line.



Problem #1

We have 20 cups of unifix cubes. How can we find out which cup has the most cubes? How can we put them in order from least to most? How can we show how many are in each cup? How can we find out how many of each color? How can we find out how many in all?



Reasoning and explaining

2. Reason abstractly and quantitatively.

- Mathematically proficient Kindergarten students:
- begin to recognize that a number represents a specific quantity.
- connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.

3. Construct viable arguments and critique the reasoning of others.

- Mathematically proficient Kindergarten students:
- construct arguments using concrete referents, such as objects, pictures, drawings, and actions.
- begin to develop their mathematical communication skills as they participate in mathematical discussions involving questions like “How did you get that?” and “Why is that true?”
- explain their thinking to others and respond to others’ thinking.



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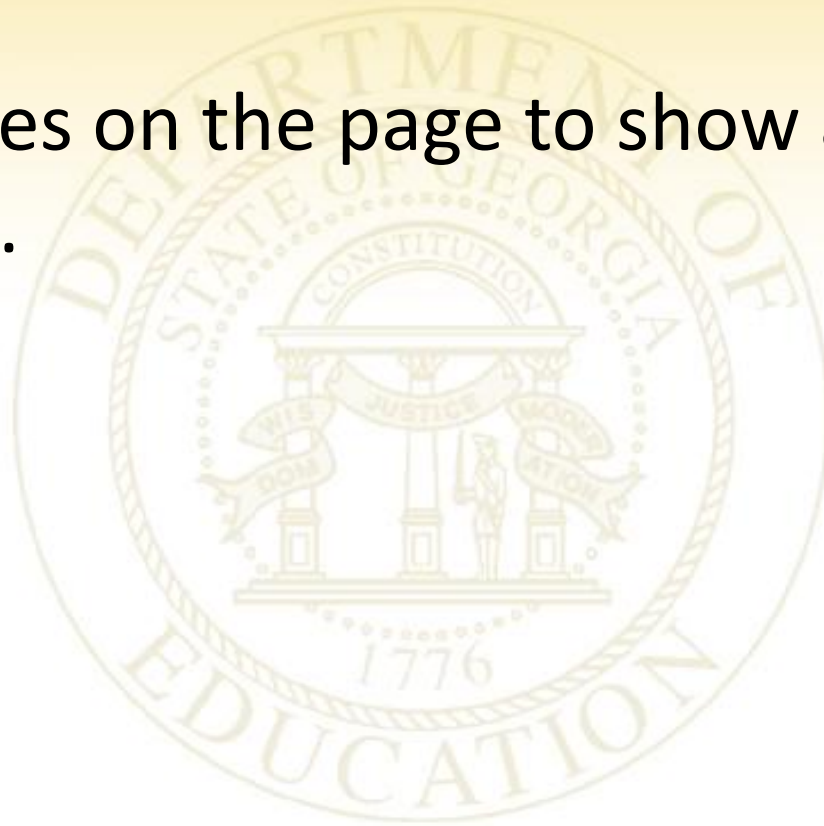


- How can we encourage students to reason abstractly and quantitatively?
- How can we support students in explaining their thinking and examining the thinking of others ?



Problem #2

- Draw circles on the page to show all the ways to make 7.



Problem #2

- I have 10 crayons. Some are red. Some are blue.
- How many of each could I have?
- How many red? How many blue?
- Find as many combinations as you can.

(My Kids Can, 2009)



Modeling and using tools

4. Model with mathematics.

- Mathematically proficient Kindergarten students:
- experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc.
- need opportunities to connect the different representations and explain the connections.
- should be able to use all of these representations as needed.

5. Use appropriate tools strategically.

- Mathematically proficient Kindergarten students:
- begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, kindergarteners may decide that it might be advantageous to use linking cubes to represent two quantities and then compare the two representations side-by-side.



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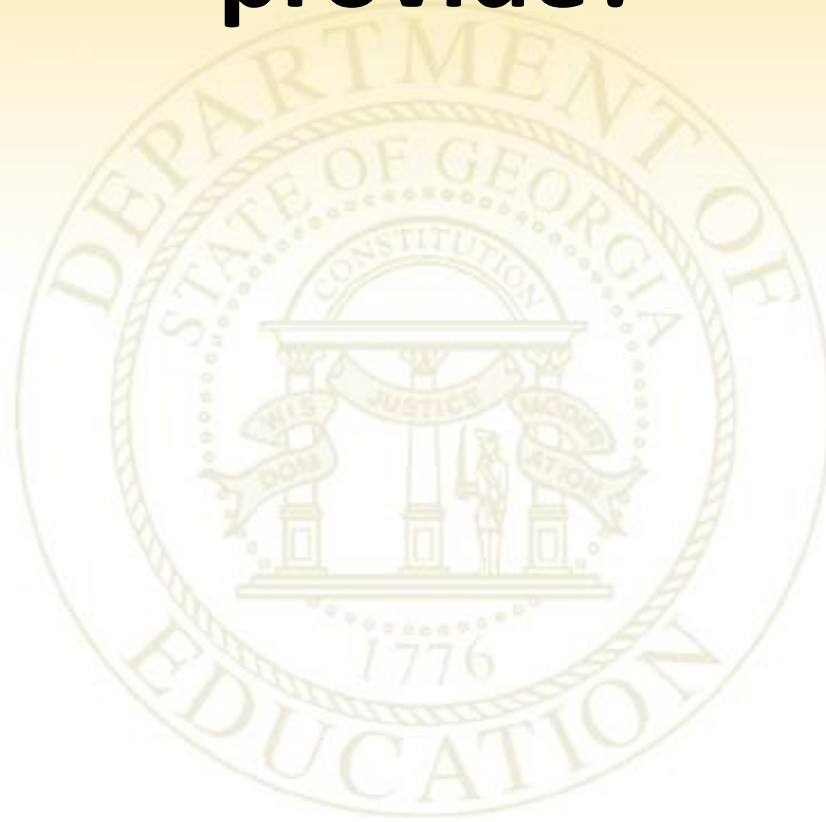
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What tools and situations can we provide?



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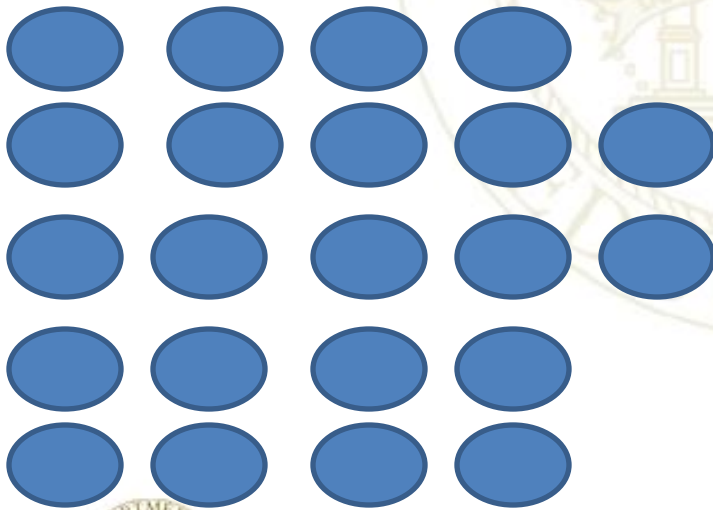
Problem #3

- Count how many. Circle the number that matches how many. 7 2



Problem #3

- Priya's dad brought 22 cookies for snack today.
- Will that be enough for everyone in the class to have one?



Seeing structure and generalizing

7. Look for and make sense of structure.

- Mathematically proficient kindergarten students:
 - begin to discern a pattern or structure. For instance, students recognize the pattern that exists in the teen numbers: every teen number is written with a 1 (representing one ten) and ends with the digit that is first stated. They also recognize that $3 + 2 = 5$ and $2 + 3 = 5$.

8. Look for and express regularity in repeated reasoning.

- Mathematically proficient kindergarten students:
 - notice repetitive actions in counting and computation, etc. For example, they may notice that the next number in a counting sequence is one more. When counting by tens, the next number in the sequence is “ten more” (or one more group of ten).
 - continually check their work by asking themselves, “Does this make sense?”



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Seeing structure and generalizing

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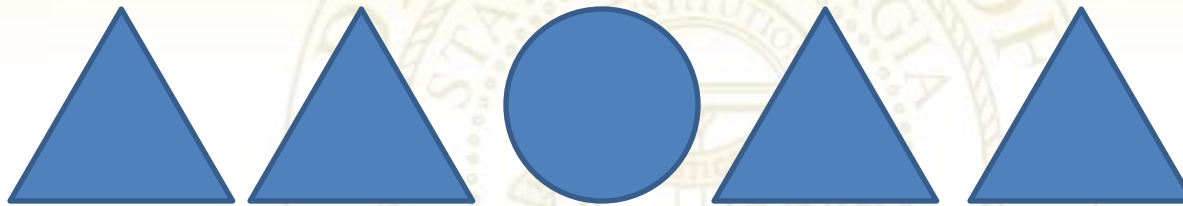
How is this different from what we used to think?

- What are patterns in mathematics?
- How can make them explicit?
- Subitization
- Ten frames
- Number word patterns
- Doubling
- Spatial patterns
- *Patterning is the search for regularity and structure*



Problem #4

- Continue the pattern:



Problem #4

- <http://www.youtube.com/watch?v=fBXKnVQ0i7g>



Where can we start?

- GaDOE Teaching Guides
- http://public.doe.k12.ga.us/ci_services.aspx?PageReq=CIServMath
- Learning Village
- <https://portal.doe.k12.ga.us/LearningVillageLogin.aspx>
- List Serve
- join-mathematics-k-5@list.doe.k12.ga.us
- join-mathematics-6-8@list.doe.k12.ga.us
- join-mathematics-9-12@list.doe.k12.ga.us
- join-mathematics-districtsupport@list.doe.k12.ga.us
- join-mathematics-administrators@list.doe.k12.ga.us
- join-mathematics-resa@list.doe.k12.ga.us
- Inside Mathematics
- <http://www.insidemathematics.org/>
- Teaching Channel
- http://www.teachingchannel.org/videos?categories=topics_common-core
- Arizona
- <http://www.ade.az.gov/standards/math/2010MathStandards/>
- New York City
- <http://schools.nyc.gov/Academics/CommonCoreLibrary/SeeStudentWork/default.htm>
- North Carolina
- <http://www.ncpublicschools.org/acre/standards/extended/>
- Ohio
- <http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEPrimary.aspx?page=2&TopicRelationID=1704>



Recommended Reading

- *Number Talks*, Sherry Parrish
- *My Kids Can*, Judy Storeygard
- *Young Mathematicians at Work*, Catherine Twomey Fosnot
- *Learning and Teaching Early Math*, Clements and Sarama

These are Turtle's recommendations, not the DOE's recommendations.



Recommended Viewing

- Teaching Channel- CCSS videos-
<http://www.youtube.com/watch?v=1IPxt794-yU&NR=1>
- K-5 Standards for Mathematical Practice prezi-
<http://prezi.com/zkopzkys49kk/k-5-ccgps-standards-for-mathematical-practice/>
- Learner.org- math videos-
<http://www.learner.org/resources/series32.html?pop=yes&pid=911#>



3 things?

- Something to do tomorrow?
- Resources?
- Something to think about? Homework!
- Watch this-

http://www.learner.org/resources/series32.html#program_descriptions (#7- Cubes and Containers) Talk about it...Try it!



Feedback

- Choose one thing, and enter it into the chat window.
- An AHA! (!)
- A question (?)
- Something positive from today's session (+)
- Something you will change as a result of today's session, or *that you wish I would change!* (c)



**Thank you for all
you do.
Keep calm and
carry on.**

