

# Standards for Mathematical Practice in Elementary School Classrooms

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## Background on CCSSM

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- ▶ Created at the request of a group of governors
- ▶ Adopted by 45 states, the District of Columbia, and 4 U.S. territories
- ▶ Formal assessment will begin in 2014-15
- ▶ Strengths and weaknesses



Standards for Mathematical Practice

Standards for Mathematical Content



# Standards for Mathematical Practice

## Standards for Mathematical Content

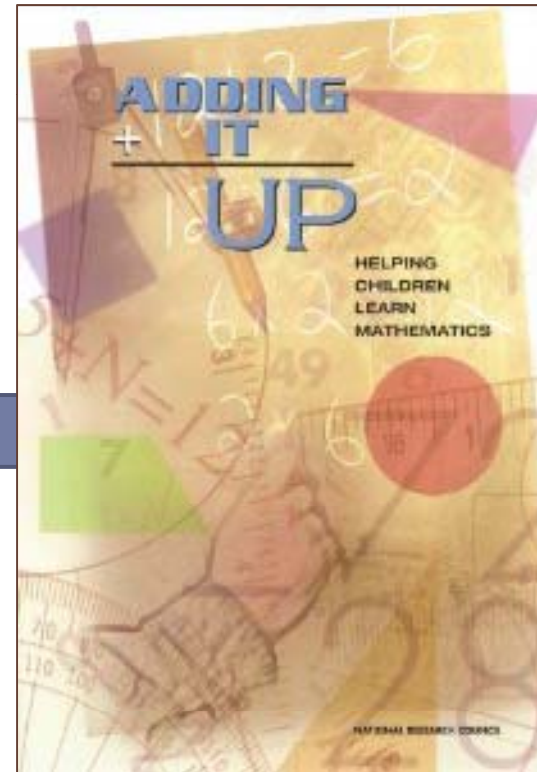
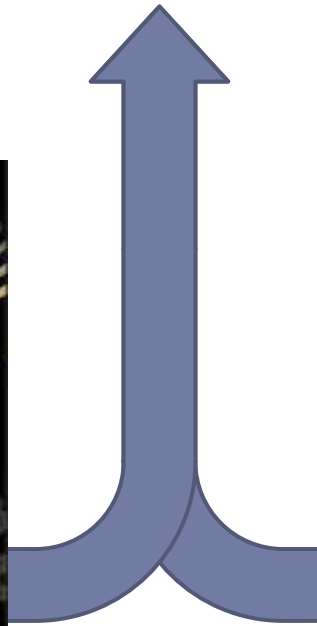
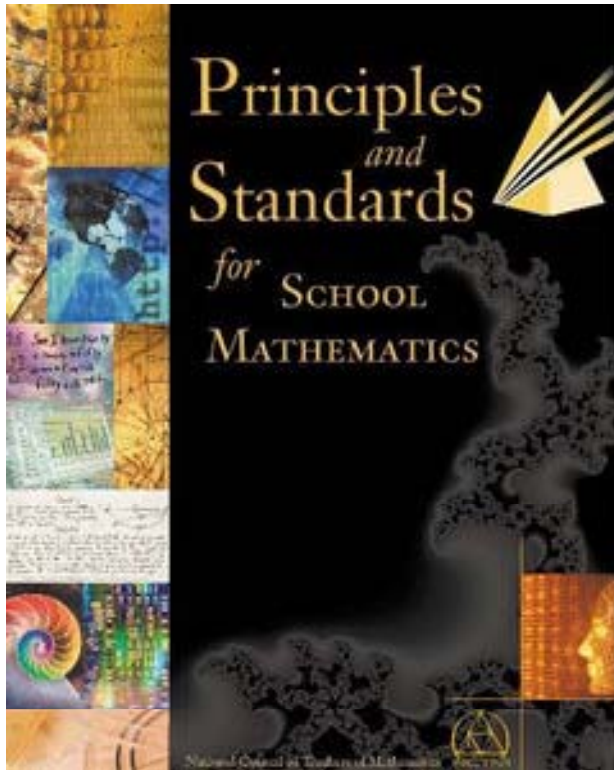


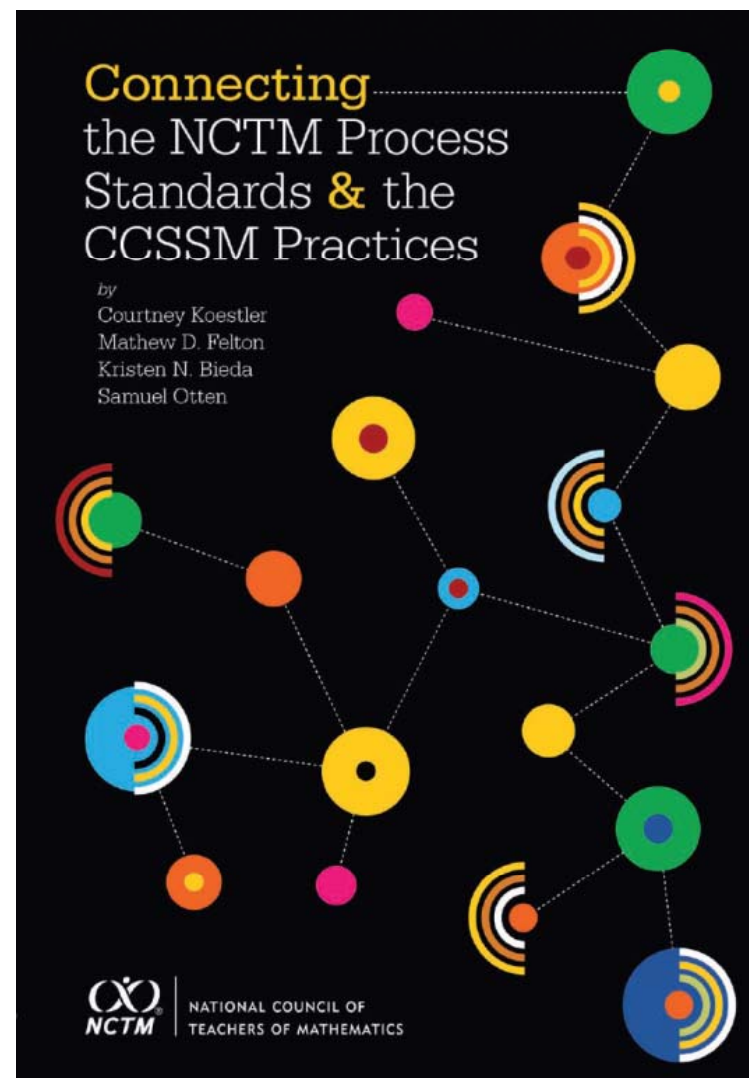
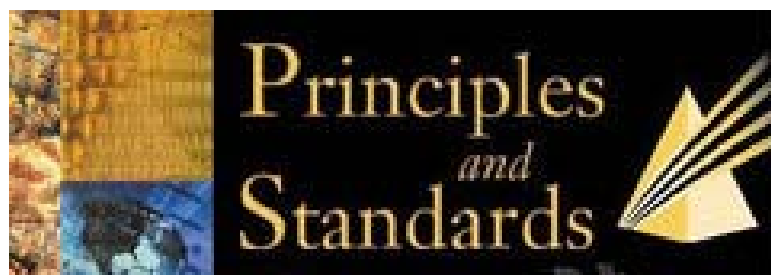
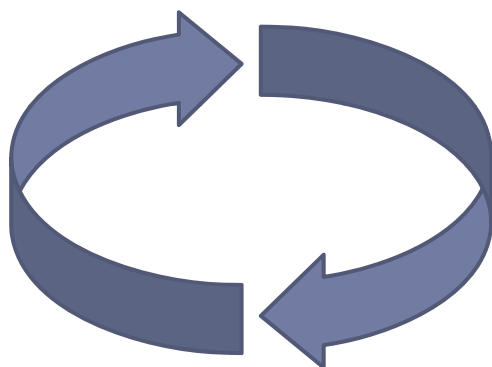
- 1. Make sense of problems and persevere in solving them**
- 2. Reason abstractly and quantitatively**
- 3. Construct viable arguments and critique the reasoning of others**
- 4. Model with mathematics**
- 5. Use appropriate tools strategically**
- 6. Attend to precision**
- 7. Look for and make use of structure**
- 8. Look for and express regularity in repeated reasoning**



# COMMON CORE STATE STANDARDS INITIATIVE

PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER







# Unpacking the CCSSM Practices

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- ▶ Minimal unpacking in Common Core
- ▶ Should permeate K-12 mathematics
  - “this book is intended as a roadmap to help teachers navigate these practices” (Koestler, Felton, Bieda, & Otten, 2013)
- ▶ Should be integrated with the content standards



# Overview

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- ▶ Discuss two practices in small groups (15 min)
- ▶ Do a mathematics problem (15 min)
- ▶ Discuss your practices in relation to the task (15 min)

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## Discuss the Practices

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- ▶ You are getting:
  - ▶ Two of the CCSSM Practices
  - ▶ An overview of the NCTM Process Standards
  - ▶ **Work with people with the same color paper**
  
- ▶ Focus on understanding and unpacking the CCSSM Practices
  - ▶ NCTM Process Standards are secondary

## Discuss the Practices

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- ▶ Read the practices individually
- ▶ Discussion points
  - ▶ Clarify any confusing language/terms/phrasing
  - ▶ How will/do you do this in your teaching?
  - ▶ What activities/tasks do you envision for this?
  - ▶ What potential difficulties might you face?

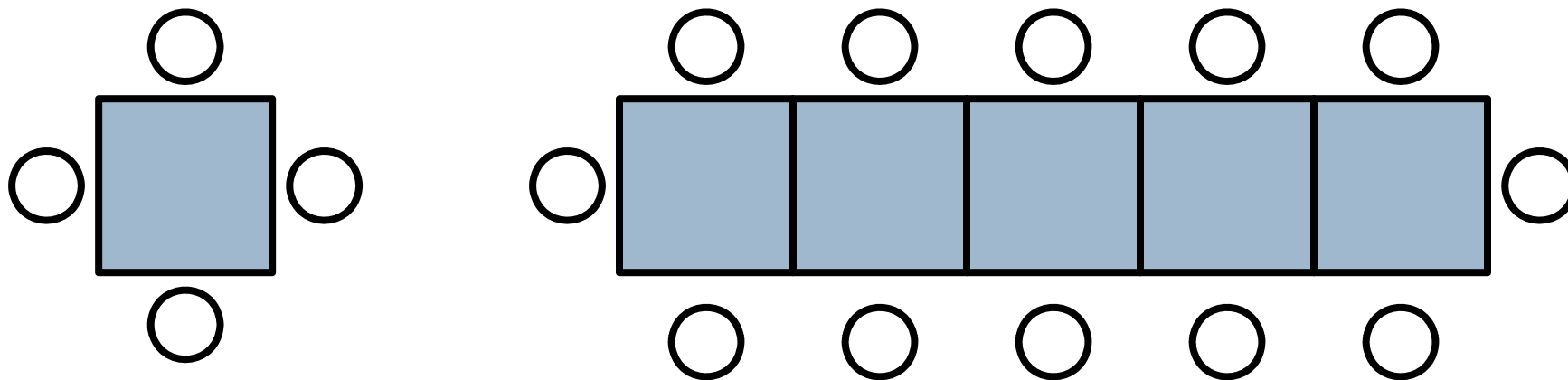
# Overview

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## How Many Seats?

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- ▶ Without counting one-by-one: **How many people could sit at a row of 27 tables?**
  - ▶ Think about multiple children's strategies
- ▶ Extension: Write directions for how to find the number of people that can sit at **any number of square tables** in a row.

# Overview

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- ▶ Discuss two practices in small groups (15 min)
- ▶ Do a mathematics problem (15 min)
- ▶ **Discuss your practices in relation to the task**
  - ▶ Small Groups (5 min)
  - ▶ Whole Group (10 min)



## How Many Seats? and the Practices

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- ▶ How did your practices show up in the activity?
  - ▶ If they did not, could the activity be modified to emphasize your practices?
- ▶ What could be done to further emphasize your practices in this task?
- ▶ How do your practices relate to...
  - ▶ the other practices in this task?
  - ▶ the NCTM Process Standards in this task?

## Practice 1. Problem solving

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- ▶ Multiple strategies and entry points
- ▶ Connections among strategies
- ▶ Tables, pictures, manipulatives

## Practice 2. Quantitative reasoning

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- ▶ **Make connections between**
  - ▶ Context (seats at a table), and
  - ▶ Mathematical representations (symbols, tables, general directions)

## Practice 3. Arguments and Reasoning

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- ▶ “5 tables can seat 12 people, so 10 tables can seat 24 people” (doubling)
- ▶ Justify strategy in terms of the context

## Practice 4. Modeling

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- ▶ “5 tables can seat 12 people, so 10 tables can seat 24 people” (doubling)
- ▶ “Add 2 each time”
- ▶ Justify strategy in terms of the context
- ▶ Use tools (such as diagrams and tables)

## Practice 5. Tools

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- ▶ Tables, diagrams, manipulatives, calculator

## Practice 6. Precision

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- ▶ Communicate strategy to others
- ▶ Connect mathematical symbols to context
  - ▶ Could introduce variables with older students



## Practices 7&8. Use Structure & Express Regularity

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- ▶ Notice repeated calculations (e.g., adding 2) and shorten with multiplication
- ▶ Use physical structure of row of squares
- ▶ Develop general written rule

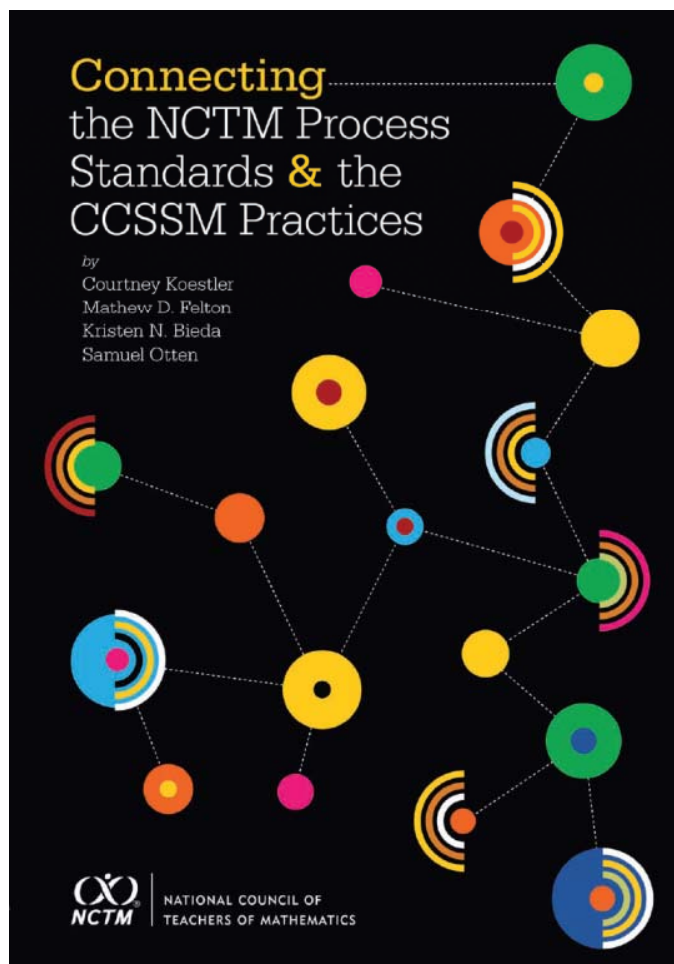
## Conclusion

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- ▶ Problem solving tasks are most productive
- ▶ Practices are interrelated
- ▶ Practices should be integrated with content
- ▶ NCTM resources

# Thank You

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