

Ridiculous Rulers and other Zany Measurement Ideas

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A Longitudinal Examination of Children's Developing Knowledge of Measurement: *Mathematical and Scientific Concept and Strategy Growth from Pre-K through Grade 5*

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<http://childrensmeasurement.org/>

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What we do....

*We study the way children
think and learn about spatial measurement
(length, area, and volume).*

We work with Hypothetical Learning Trajectories (HLT)

1. A learning goal
2. A likely path for learning
3. The instructional tasks that help children move along that path

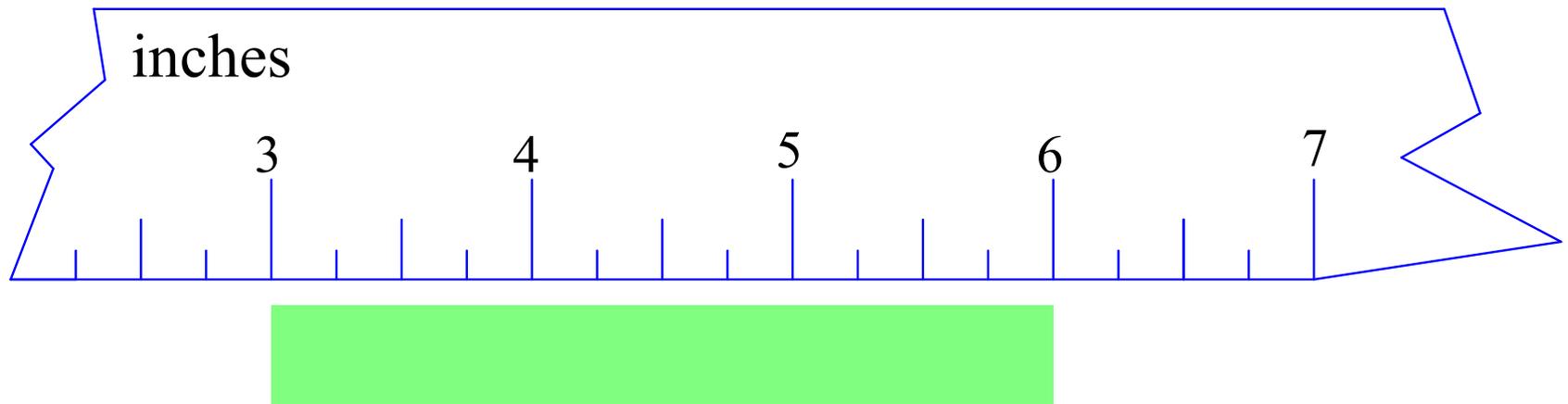
Purpose of the session today:

- Introduce measurement learning trajectories as resources to guide the instruction of geometric measurement topics.
- Provide examples of lessons based on measurement tasks consistent with the CCSS-M's treatment of measurement (see our upcoming NCTM book!).
- Navigate the Common Core State Standards for Mathematical Content (CCSS-M)

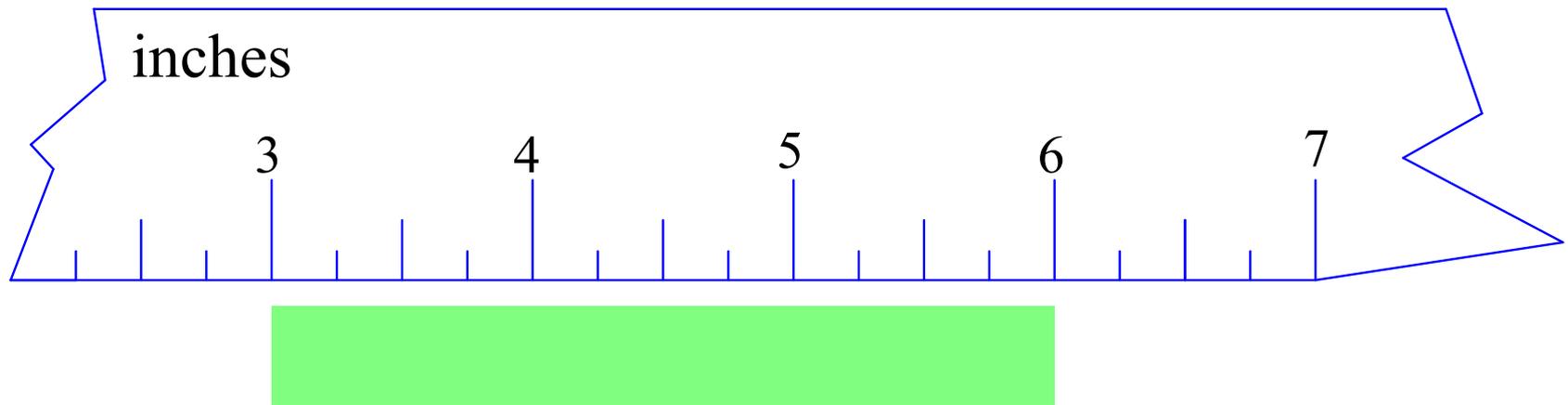
Why is measurement important?

- It is an essential topic in school mathematics.
- It is a branch of mathematics that links geometry and number.
- It is a practical skill with applications for daily life.
- It helps connect science and mathematics.

2000 NAEP Assessment

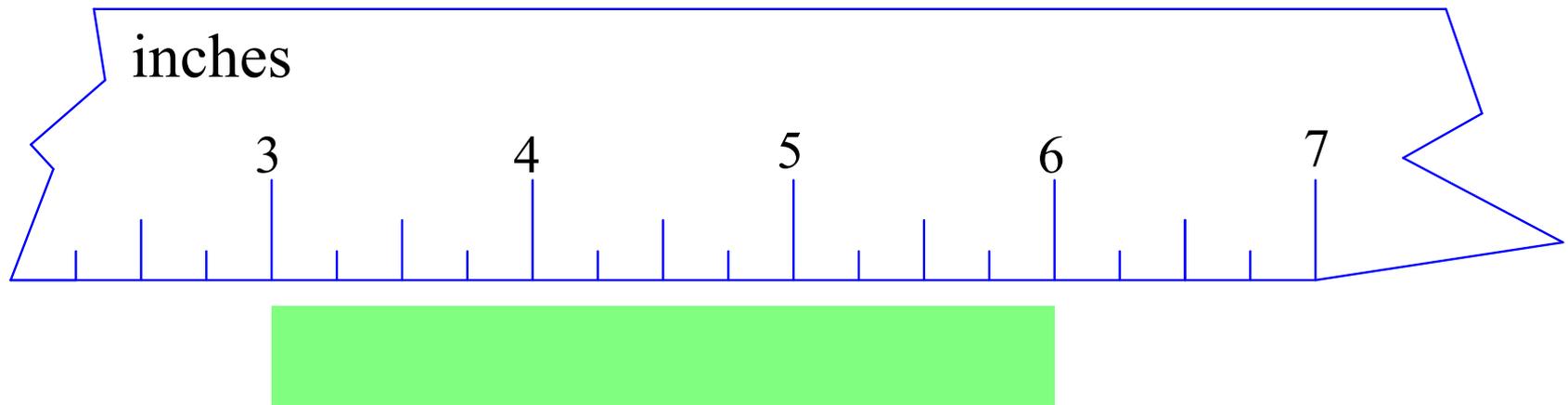


2000 NAEP Assessment



What do you think the answer is and what percent of our nation's Grade 4 and 8 students were able to correctly answer an item like this one?

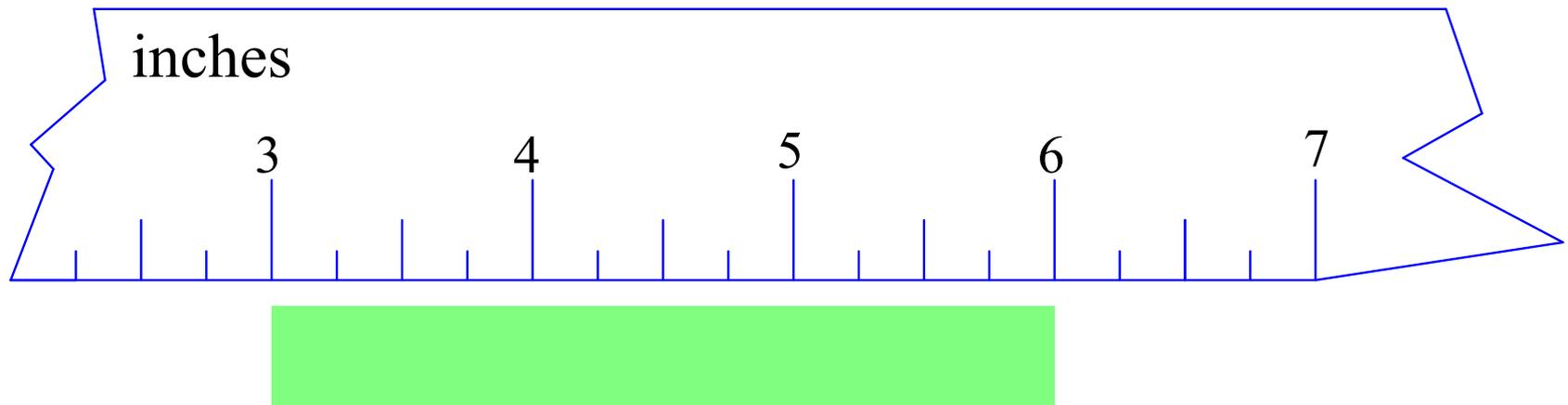
2000 NAEP Assessment



Less than 25% of our nation's Grade 4 students answered an item like this one correctly in 2000.

(Kloosterman et al., 2004)

2000 NAEP Assessment



Less than 25% of our nation's Grade 4 students answered an item like this one correctly in 2000.

Just 60% of our nation's Grade 8 students answered an item like this one correctly in 2000.

(Kloosterman et al., 2004)

Purpose of the Presentation

- Introduce measurement learning trajectories as resources to guide the instruction of geometric measurement topics.
- Provide examples of students working on measurement tasks consistent with the CCSS-M's treatment of measurement.

Our learning trajectory about Length Measurement

- Eight levels:
 - (1) Length Quantity Recognizer
 - (2) Length Comparer
 - (3) End-to-End Length Measurer
 - (4) Length Unit Relater and Repeater
 - (5) Consistent Length Measurer
 - (6) Conceptual Ruler Measurer
 - (7) Integrated Conceptual Path Measurer
 - (8) Coordinated, Integrated Abstract Measurer with Derived Units



Increasing in
Sophistication

Relating CCSS-M to HLT for Length

CCSSM	Length Learning Trajectory
<p>1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; ...</p>	<p>(3) End-to-End Length Measurer Lays units end-to-end to create measures for comparison. ...</p>

Relating CCSS-M to HLT for Length

CCSSM	Length Learning Trajectory
<p>1.MD.A.2 understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. <i>Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.</i></p>	<p>(3) End-to-End Length Measurer Lays units end-to-end use equal-size units or to avoid gaps between “units” is enhanced by increased attention to composing a length from parts or sweeping through a length with parts.</p>

Purpose of the Presentation

- Introduce measurement learning trajectories as resources to guide the instruction of geometric measurement topics.
- Provide examples of students working on measurement tasks consistent with the CCSS-M's treatment of measurement.

Examples of Length Measurement Activities

- Grade 2: Activity 1 (forthcoming text):
 - [The Long and the Short of It](#)
- Grade 2: Activity 7:
 - Ridiculous Rulers (Zany!)
 - [Video example of one Second Grade Student](#)
- Also: Grade 3: Activity 6,
 - Mis-labeled Rulers and
 - the Golden Ruler

Grade 2 Tutoring: Measuring a Paper Strip with a ruler fragment



Part II (same day)



Summary: Lessons Learned about Task Design

- Pose simple tasks that involve making comparisons.
- Prepare tasks that highlight student's thinking about unit and repeated units.
 - Vary the representation of the unit.
 - Provide concrete manipulatives (strips, tiles, or cubes), but not enough to completely cover or fill.
- Invite students to share their solutions and highlight those that involve identifying and operating on groups of units.

Discussion

- What challenges have you experienced in your teaching of length measurement?
- How do you think you would modify the tasks we shared with you today to enhance your measurement instruction?

Thank you for attending!

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