## 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 5Principle Investigators:

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## Purpose of the Presentation

- Introduce measurement learning trajectories as resources to guide the instruction of geometric measurement topics.
- Provide examples of 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

## 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)


Ridiculous Ruler 1: Even intervals are marked, yet they are labeled with non-sequential integer values


Ridiculous Ruler 2: Even intervals are marked, yet labeled with inconsistent differences between label values


Ridiculous Ruler 3: Even intervals are marked and labeled with consistent differences, yet the labeled values begin at 3 rather than 0


Ridiculous Ruler 4: Uneven intervals are marked, yet they are labeled by integers increasing by 1


Ridiculous Ruler 5: Uneven intervals are marked, but the labels for each mark are based on an actual unit measurement between 0 and each mark.

Several possible examples with explanations about counting space and using numbers:

each space is marked with a hop motion.

the end of each inch is marked with a dot, and counted in order.
more ways to find the length along a broken ruler:


This approach shows the re-numbering to repair the ruler and fit the object.


Here the endpoints are marked, and we find the difference: $6-2=4$. So the length is 4 inches.

## 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.

