A Measurement Approach to Place Value Concepts

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What ideas do you associate with place value? (2-3 words)

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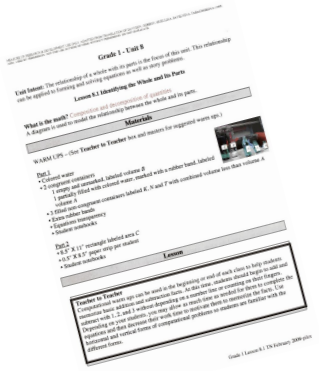
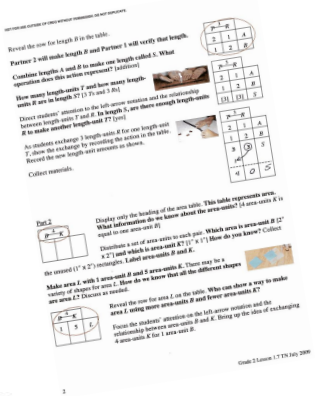
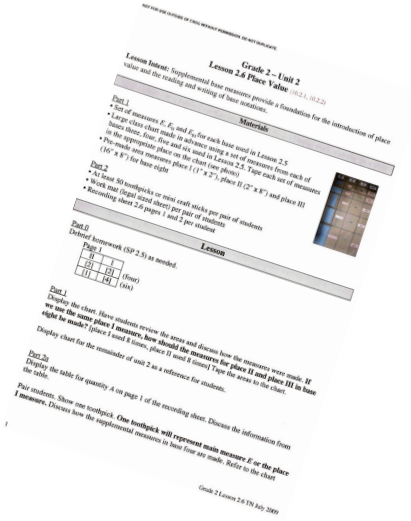
Learning the concept of place value within a measurement context

Lessons were adapted from the *Measure Up* project (Dougherty, et al., 2002) based on the work of Davydov (1975a), (1975b).

- Spontaneous concepts vs. scientific concepts
- Generalized contexts preceding specific ones

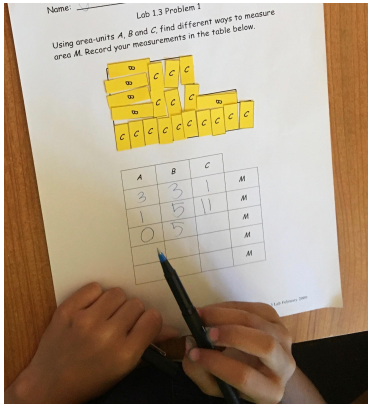






Mathematics through the context of continuous quantities

Length



Area

Volume

Out-of-this-World Adventures

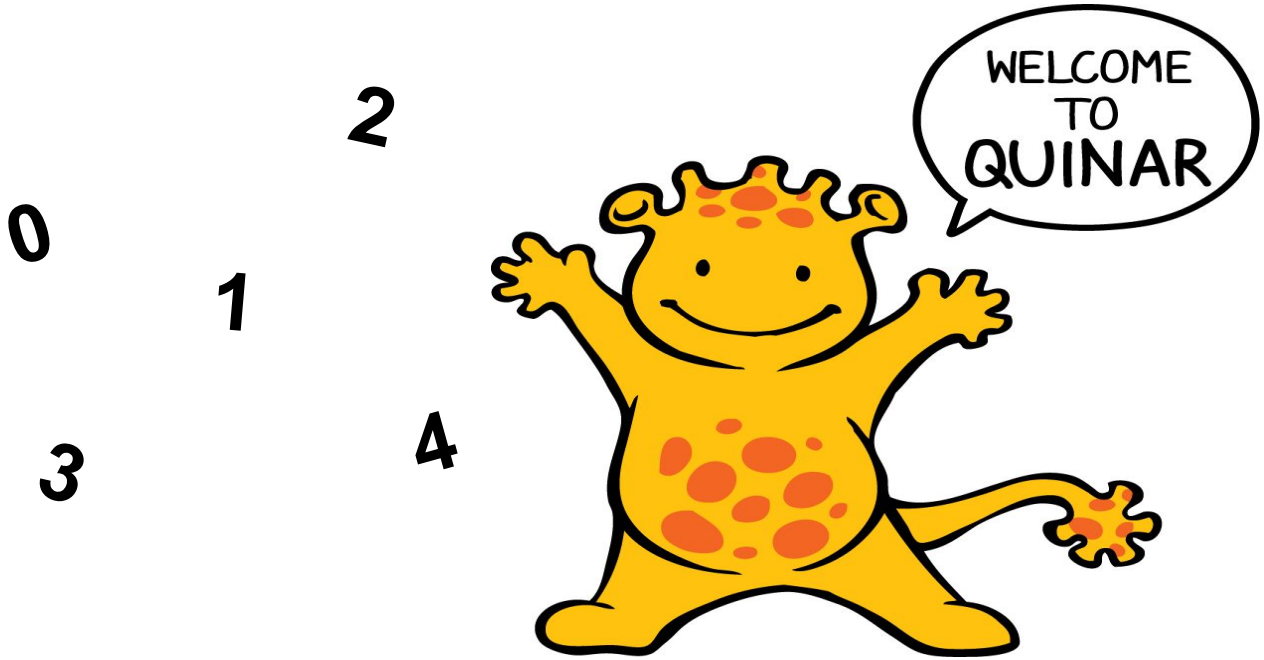
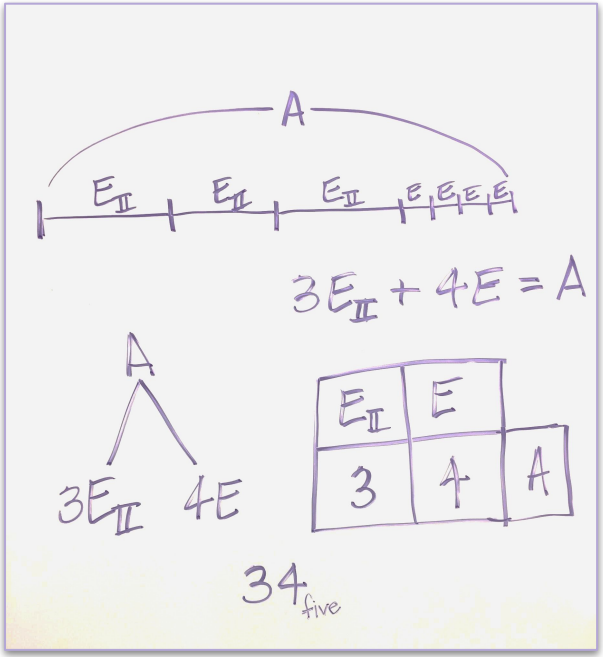


Illustration by Kelli Ann Harada

- Using only place II and place I units, how many ways can you make length A?

Concurrent Multiple Representations



More Extraterrestrial Adventures!

1

0

2

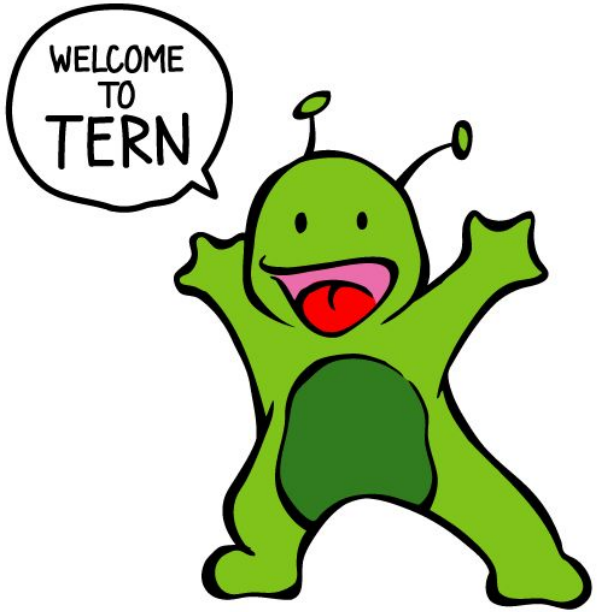


Illustration by Kelli Ann Harada

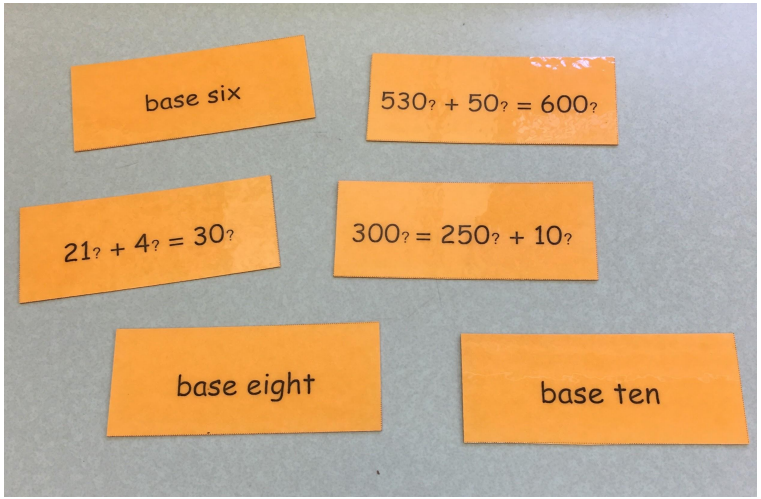
- Use your units to create an area that is represented by your number.
- Represent the measure of your area using
  - line segments
  - a part-whole diagram
  - as an equation
  - a number
  - a table

Lengths

- Black rod
- Pink rod
- Orange rod

Base Match

Match the equation to the base number system.



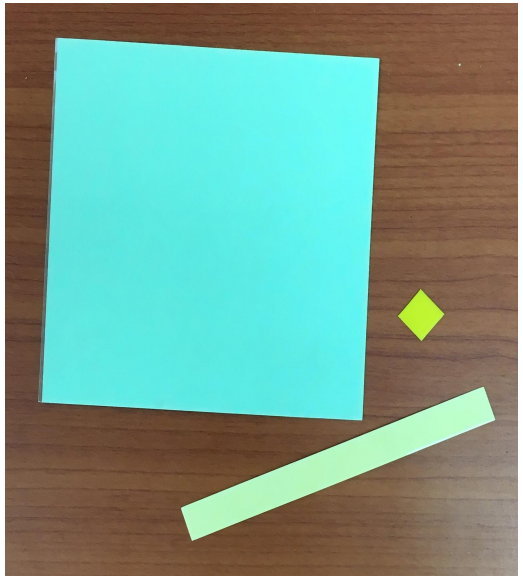
Welcome to the Decimal World

Use the length-unit (“one, base ten”) to make

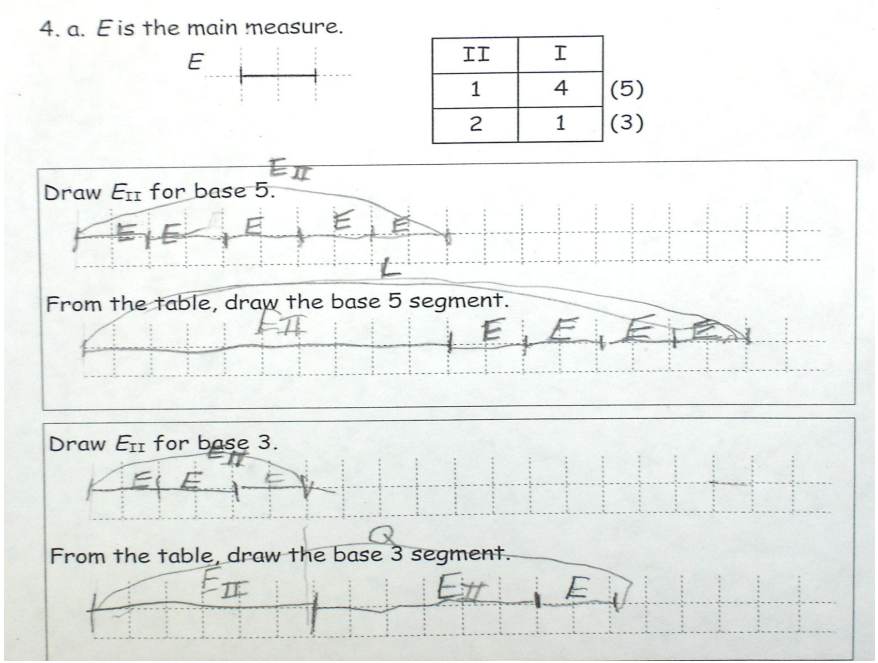
- A place two length-unit (“one-zero, base ten”)
- A place three length-unit (“one-zero-zero, base ten”)

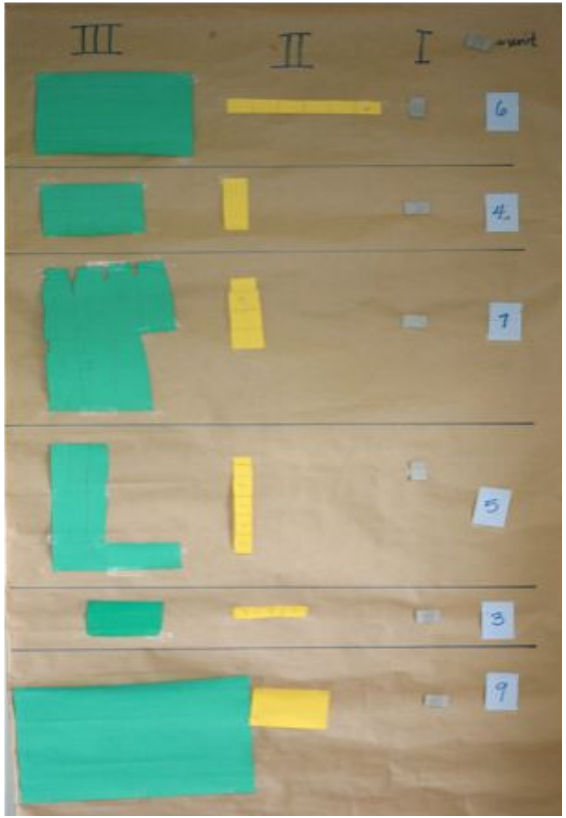
Using area units to represent each base ten place

How big is a thousand area-unit?



Place value as a structure





a. 43_5 $<$ 43_7

I looked at 43_5 and 43_7 since the 43 in both of them it was up to the base $5<7$ so 43_5 is $<$ 43_7

b. 21_3 $>$ 12_3

I looked at 21_3 and 12_3 since the base is the same its up to the digits $21_3 > 12_3$ 21_3 is $>$ than 12_3

a. 43_5 < 43_7

43_5 is lesser than 43_7 because base 7 is higher than base 5 and 43_7 has more units.

b. 21_3 > 12_3

21_3 graeter than 12_3 because even thor there in the samr base 21_3 has more units.

Time to Reflect

- How can working in different base number systems deepen students' understanding of place value?
- How does using continuous quantities compare to using discrete objects for modeling place value concepts?

Questions?

Thank You!

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