

Learning Mathematics for Teaching



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The **Learning Mathematics for Teaching** (LMT) project develops and uses multiple-choice measures of teachers' content knowledge for teaching mathematics. Different from conventional measures of teachers' content knowledge in mathematics, these items investigate teachers' mathematical knowledge as it is used within particular tasks of teaching. For instance, these measures do not only assess whether teachers know that $35 \times 25 = 875$, but also whether teachers can analyze and understand different methods for solving this problem (see inset). LMT and others use these measures to investigate the effectiveness mathematics professional development in improving teacher knowledge. Contact Heather Hill (hhill@umich.edu) for more information on measures dissemination.

Student A	Student B	Student C
$\begin{array}{r} 35 \\ \times 25 \\ \hline 125 \\ +75 \\ \hline 875 \end{array}$	$\begin{array}{r} 35 \\ \times 25 \\ \hline 175 \\ +700 \\ \hline 875 \end{array}$	$\begin{array}{r} 35 \\ \times 25 \\ \hline 25 \\ 150 \\ 100 \\ +600 \\ \hline 875 \end{array}$

Which of these students is using a method that could be used to multiply any two whole numbers?

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imt Available measures

- Multiple-choice measures of teachers' knowledge for teaching:
 - Number and operations, K-6
 - Patterns, functions, and algebra K-6
 - Geometry, 3-8
- DRAFT middle school measures—June 2004
 - Number and operation
 - Pre-algebra and algebra
 - Geometry
 - Multiplicative reasoning

What we offer MSPs

Administration options, K-6 forms:

- Use our pre-tested, pre-equated parallel forms
 - No scaling required
- Create your own measures from our item pool
 - Can tailor measures to your MSP program

Training:

- Dissemination workshop June 18, 2004
 - Contact Heather Hill at hhill@umich.edu

Ongoing measures validation

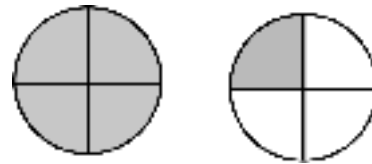
- Factor analyses and scaling
- Cognitive interviews
- Comparison groups (e.g., mathematicians)
- Against student achievement data
 - Study of Instructional Improvement



Representing number concepts

Mrs. Johnson thinks it is important to vary the whole when she teaches fractions. For example, she might use five dollars to be the whole, or ten students, or a single rectangle. On one particular day, she uses as the whole a picture of two pizzas. What fraction of the two pizzas is she illustrating below? (Mark ONE answer.)

- b) $\frac{5}{4}$
- c) $\frac{5}{3}$
- d) $\frac{5}{8}$
- e) $\frac{1}{4}$



Representing operations

15. Mrs. Akellar was reading a short story that had the following passage in it:

**Ten frogs sat on the side of a riverbank.
Three frogs hopped in the water.**

Mrs. Akellar asked her students to represent this passage using number sentences, and a student volunteered “ $10 - 3 = 7$.” Mrs. Akellar continued to read:

**Along came the rain, and three more
frogs jumped in the water.**

What number sentence should Mrs. Akellar’s class choose to represent this next part of the story? (Mark ONE answer.)

h) $10 - 3 = 7$

i) $10 - 4 = 6$

j) $7 - 3 = 4$

k) $7 - 4 = 3$

Number concepts explanations

Ms. Harris was working with her class on divisibility rules. She told her class that a number is divisible by 4 if and only if the last two digits of the number are divisible by 4. One of her students asked her why the rule for 4 worked. She asked the other students if they could come up with a reason, and several possible reasons were proposed. Which of the following statements comes closest to explaining the reason for the divisibility rule for 4? (Mark ONE answer.)

- c) Four is an even number, and odd numbers are not divisible by even numbers.
- e) The number 100 is divisible by 4 (and also 1000, 10,000, etc.).
- g) Every other even number is divisible by 4, for example, 24 and 28 but not 26.
- i) It only works when the sum of the last two digits is an even number.