

PD in a Flash!
Cognitively Guided Instruction (CGI)
 Kim Gillam, Illinois

Staff Development Goals

1. ... clearly support linguistically appropriate content and language objectives throughout the Math MATTERS lessons?
2. ... emphasize key vocabulary within Math MATTERS?
3. ... provide frequent opportunities for interaction and discussion during Math MATTERS lessons?
4. ... employ a variety of question types during Math MATTERS lessons? (for example, using questions focusing on knowing, organizing, applying, analyzing, generating, integrating, and evaluating)
5. ... adapt content through graphic organizers, visual representations (non-linguistic representation), or taped texts for Math MATTERS lessons?
6. ... provide differentiated instruction for students with different math learning needs in the Math MATTERS lessons?
7. ... aid students in writing complete number sentences for CGI problems?

What is CGI?

Major Theses

Children bring an intuitive knowledge of mathematics to school with them and this knowledge should serve as the basis for developing formal mathematics instruction in primary school.

Math instruction should be based on the relationship between computational skills and problem solving, which leads to an emphasis on problem solving in the classroom instead of the repetition of number facts.

<http://www.promisingpractices.net/program.asp?programid=114>



What does this mean?

Children are problem solvers.
Understanding of mathematical concepts comes before algorithms.
Children need to solve problems in their own ways.
Teachers and peers can facilitate connections among different solution strategies.
Teachers can connect strategies to mathematical representations.

What does this look like?


Pose a problem
Give students time to solve in their own way
Students share their solution strategies with others
Connect different solution strategies
Model mathematical representations


Let's Try It!

- [Pose](#)
- [Solve](#)
- [Share](#)
- [Connect](#)
- [Represent](#)





Solve and Share

Drawing/Manipulating...	Reasoning/Mental Math...
	"I knew that (6) 10s would be 60 and (6) 1s would be 6 more so that's 66. 6 quarters would be \$1.50. I knew that 66 and one more is 67 and then 50 cents more would make \$67.50."



Connect

How are these the same?	How are these different?
	"I knew that (6) 10s would be 60 and (6) 1s would be 6 more so that's 66. 6 quarters would be \$1.50. I knew that 66 and one more is 67 and then 50 cents more would make \$67.50."



Represent

How did you solve it?

First I added my 10s...
 $10 + 10 + 10 + 10 + 10 + 10 = 60$

Then I counted on by 1s...
 $60 + 1 + 1 + 1 + 1 + 1 + 1 = 66$

Finally I added the \$1.50...
 $\$66.00 + \$1.50 = \$67.50$

My answer is that Anita saved
 $\$67.50$ in her Short Term money jar.

Pose

Anita put \$11.25 away in her Short Term money jar every week for 6 weeks. How much did she have in the jar then?

\$11.25
6
?

Solve and Share

Talking it Out/Algorithm

"I multiplied because I knew if you had \$11.25 six times, or six groups of \$11.25, all you had to do was multiply. I wrote

$$6 \times \$11.25 = \$67.50$$

Drawing an Array

I made 6 rows with 11 and one-fourth circles in each. I used one-fourth because I know that a quarter is one-fourth of \$1.00.

$$6 \times \$11.25 = \$67.50$$

Represent

Oral Explanation	Mathematical Representation
<p>Solved mentally...</p> <p>"I knew that (6) 10s would be 60 and (6) 1s would be 6 more so that's 66. 6 quarters would be \$1.50. I knew that 66 and one more is 67 and then 50 cents more would make <u>\$67.50</u>."</p>	<p>$6 \times \\$10.00 = \\60.00 $6 \times \\$1.00 = \\6.00 $\\$60.00 + \\$6.00 = \\$66.00$</p> <p>$6 \times \\$ 0.25 = \\1.50</p> <p>$\\$66.00 + \\$1.00 = \\$67.00$ $\\$67.00 + \\$ 0.50 = \underline{\\$67.50}$</p>

Practice Writing Number Sentences

Pose problem	Set it up
<p>Margo worked in a bakery. She could knead a loaf of bread every <u>5.1</u> minutes. At that rate, how long would it take her to knead <u>9</u> loaves of bread?</p>	<p>What do we know? 5.1 M 9 L ?</p> <p>What are we trying to find out? We want to find the product so we will know how long it will take Margo to complete the job. We could use repeated addition, but it would be easier to multiply, so $9 \times 5.1 = 45.9$</p> <p>It would take 45.9 minutes to knead 9 loaves of bread. *(45 minutes and 54 seconds)</p>
<p>Direct Modelers will write the fact this way: $5.1 \times 9 = 45.9$ Other students may write it this way:</p> <div style="text-align: center;"> $\begin{array}{r} 5.1 \\ \times 9 \\ \hline 45.9 \end{array}$ </div>	

Play School

Teacher	Students
<ul style="list-style-type: none"> • Read the problem to your students • Provide a visual • Ask questions • Give time to solve • Ask students to share • Make connections • Help with numerical representations 	<ul style="list-style-type: none"> • Listen to the problem • Ask for the problem to be read again • Solve the problem in different ways • Write a number sentence that matches the steps you followed • Listen to your tablemates

Play School

<p>Problem #1</p> <p>Sister Bear had __ cents from selling flowers. How many more cents will she need in order to meet her goal of raising __ cents?</p> <p style="text-align: center;">10, 50 30, 90 25, 75</p>	<p>Problem #2</p> <p>Mama and Papa Bear gave the cubs an allowance. They gave Brother Bear __ cents which was __ cents more than Sister because he is older. How much did Sister get?</p> <p style="text-align: center;">50, 10 50, 25 75, 15</p>
<p>Problem #3</p> <p>Brother Bear had __ cents. He spent __ cents on playing video games. How much does he have now?</p> <p style="text-align: center;">50, 50 50, 40 50, 29</p>	

When posing a problem...

<p style="text-align: center;">Provide a visual</p> <p style="text-align: center;">10 c ? 50 c</p> <p style="text-align: center;">What are we trying to find out? ($a + x = c$) or ($c - a = x$)</p>	<p style="text-align: center;">Provide a visual</p> <p style="text-align: center;">50 B 10 S ?</p> <p style="text-align: center;">What are we trying to find out? ($a - b = x$) or ($x + b = c$)</p>
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When posing a problem...

<p style="text-align: center;">50c 50c ?</p> <p style="text-align: center;">What do we know? What are we trying to find out? ($a - b = x$)</p>

Opportunities for All

Teachers	Students
<ul style="list-style-type: none">• Pose problems• Listen to students' thinking• Ask questions• Make decisions based on students' understandings• Differentiate problems• Help make connections• Help represent mathematical thinking• Facilitate	<ul style="list-style-type: none">• Solve problems• Speak (explain)• Listen (ask questions)• Challenge themselves to think deeply• Think flexibly• Learn from one another• Make connections• Represent mathematical thinking

Wrap Up, Questions

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Unit 1

CGI Problems for *Money Sense with Kids*



	Multiplication	Measurement Division	Partitive Division
Grouping and Partitioning	<p>Anita put ___ away in her Short Term money jar every week for ___ weeks. How much did she have in the jar then?</p> <p>(\$9.50, 5) (\$11.25, 6)</p>	<p>Anita had _____. She wanted to give several charities ____ each. How many charities could she donate to?</p> <p>(\$45.00, \$15.00) (\$70, \$17.50)</p>	<p>Anita had ____ dollars she wanted to divide equally among her ____ money jars. How much should she put in each jar?</p> <p>(\$363, 3) (\$366, 6)</p>
Rate	<p>Margo worked in a bakery. She could knead a loaf of bread every ___ minutes. At that rate, how long would it take her to knead ___ loaves of bread?</p> <p>(10, 5) (7, 8)</p>	<p>Margo worked in a bakery. She could knead ___ loaves of bread in one hour. At that rate, how long did it take them to knead ___ loaf(ves) of bread?</p> <p>(7, 1) (7, 2) (9, 3)</p>	<p>Margo worked in a bakery. She could knead ___ loaves of bread in 40 minutes. At that rate, how many loaves could she knead in ___ minutes?</p> <p>(8, 5) (5, 20) (4, 30)</p>
Price	<p>Eloy bought 7 pounds of white fish for \$2.50 a pound. How much did he pay for the fish?</p>	<p>Eloy paid \$21.77 for fish that cost \$7 a pound. How many pounds of fish did he buy?</p>	<p>Eloy paid a total of \$45 for 15 pounds of shrimp. How much did he pay a pound for the shrimp?</p>
Fractions	<p>Sammy and his 3 friends had each eaten personal sized pizza for lunch. Each had one-sixth of his pizza leftover. If they put their leftovers together, how much pizza would they have?</p>	<p>Sammy wanted to make pizza dough. The recipe called for $\frac{1}{2}$ cup flour per pizza. If Sammy had 5 cups of flour, how many pizzas could he make?</p>	<p>Sammy's recipe for pizza called for $\frac{3}{4}$ cup sausage per pizza. If Sammy could make 8 pizzas, how many cups of sausage did he have?</p>