Interpreting Cognitive Levels in the State Standards

Social Studies Indicator

- 7-3.1 Summarize the achievements and contributions of the scientific revolution, including its roots, the development of the scientific method, and the interaction between scientific thought and traditional religious beliefs.

Classroom Assessment

- Summarize information that you know about the scientific revolution by completing the chart. You may use your notes to help you complete the chart.

Scientist	Country	Contribution	Effect

Question?

- Does summarize mean the same thing in the indicator and in the assessment?

Question?

- How does student use of notes influence the cognitive level of the task?

Cognitive Levels

- Help teachers target what the state wants students to do with the content
- Help us align our expectations with the state's expectations
- Require the content to be in the student's long term memory
- Based on *A Taxonomy for Learning, Teaching, and Assessing* edited by Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, Raths, and Wittrock (2001)

Remember

Recall of facts, terminology, and pieces of information from long term memory

Recall (Remember)

- Show the information that you know about the scientific revolution by completing the chart.

Scientist	Contribution	Effect

Understand

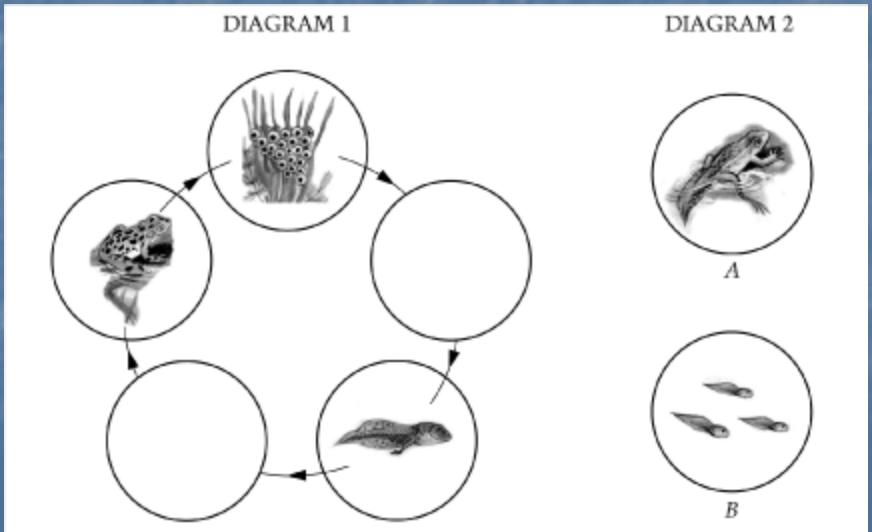
Demonstrating comprehension of instructional material through different paths (e.g., illustrating, explaining, comparing)

Explaining (Understand)

How did the heliocentric theory contribute to the scientific revolution? Your grade will be based your ability to describe multiple contributions and to include relevant details.

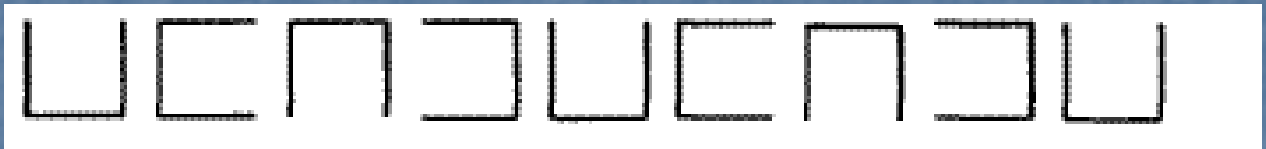
Identifying an example (Understand)

2-2.5 Illustrate the various life cycles of animals (including birth and the stages of development).



Inferring (Understand)

What is the pattern in the figure below?

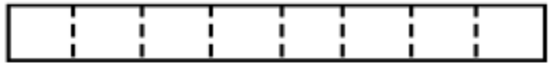


Apply

Transferring what was learned to a NEW situation or task (e.g., demonstrating procedural knowledge)

Apply a procedure

Find the sum of $\frac{3}{4}$ and $\frac{1}{8}$.



A. $\frac{3}{32}$

B. $\frac{4}{8}$

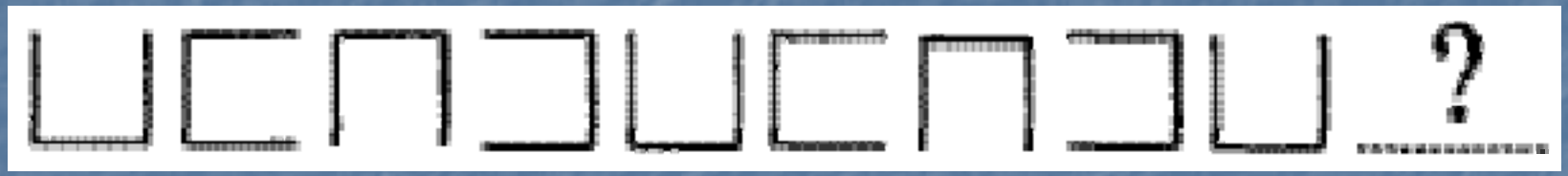
C. $\frac{4}{12}$

D. $\frac{7}{8}$

6-2.4 Apply an algorithm to add and subtract fractions.

Execute (Apply)

What figure comes next?



Analyze

Breakdown/deconstruction of a <u>new</u> situation or scenario into parts so that relationships or connections are explained

Discriminating (Analyze)

Which event has the **strongest** impact on the plot of the passage?

A. Catherine helps her brothers practice.

B. The family attends the tournament.

C. Luke is injured and cannot compete.

D. Catherine reveals her identity to the judges.

7-1.1 Analyze literary **texts** to draw conclusions and make **inferences**.

Evaluation

Making judgments about
a solution, product, or ideas in <u>new</u> material based on previously learned criteria

Critiquing (Evaluate)

- **Find an editorial from a newspaper. Read the editorial (and hand in a copy of it). Develop a response to this question:**

  Does the author effectively use the elements of persuasive writing?

- **Your grade will be based on your use of rich examples from the editorial and linking those examples to the attributes of persuasive writing that we have studied.**

Create

Constructing a new whole through understanding the parts

Constructing (Create)

- We have been learning to identify and write tonic and dominate tonal patterns and chord progressions. Using the attached chord progression develop a 16-measure melody, and notate it. Your grade will be based on the melody working with chord progression and on your ability to accurately notate the rhythms and pitches.

Notes on Cognitive Levels

- Inferring, defined as “finding a pattern within a series of examples or instances,” falls under Understand (e.g., in science)
- Example: Infer the relative age of rocks and fossils from index fossils and the ordering of the rock layers.

Notes on Cognitive Levels

- Attributing occurs when one “reads between the lines”-- falls under analyze
- Example: Analyze literary **texts** to draw conclusions and make **inferences**.

Across Content Areas

- The verb phrase “to demonstrate an understanding of” is used with its general, everyday meaning and does not describe a cognitive category (South Carolina Science Standards, p. 3)

Science & Mathematics

- Many of the indicators target *understanding*. The state does not want the student to be engaged primarily in rote learning and memorization.

English Language Arts

- Many of the indicators target Analyze. The state expects students can read cold (unfamiliar) texts and demonstrate the skills in the indicators.

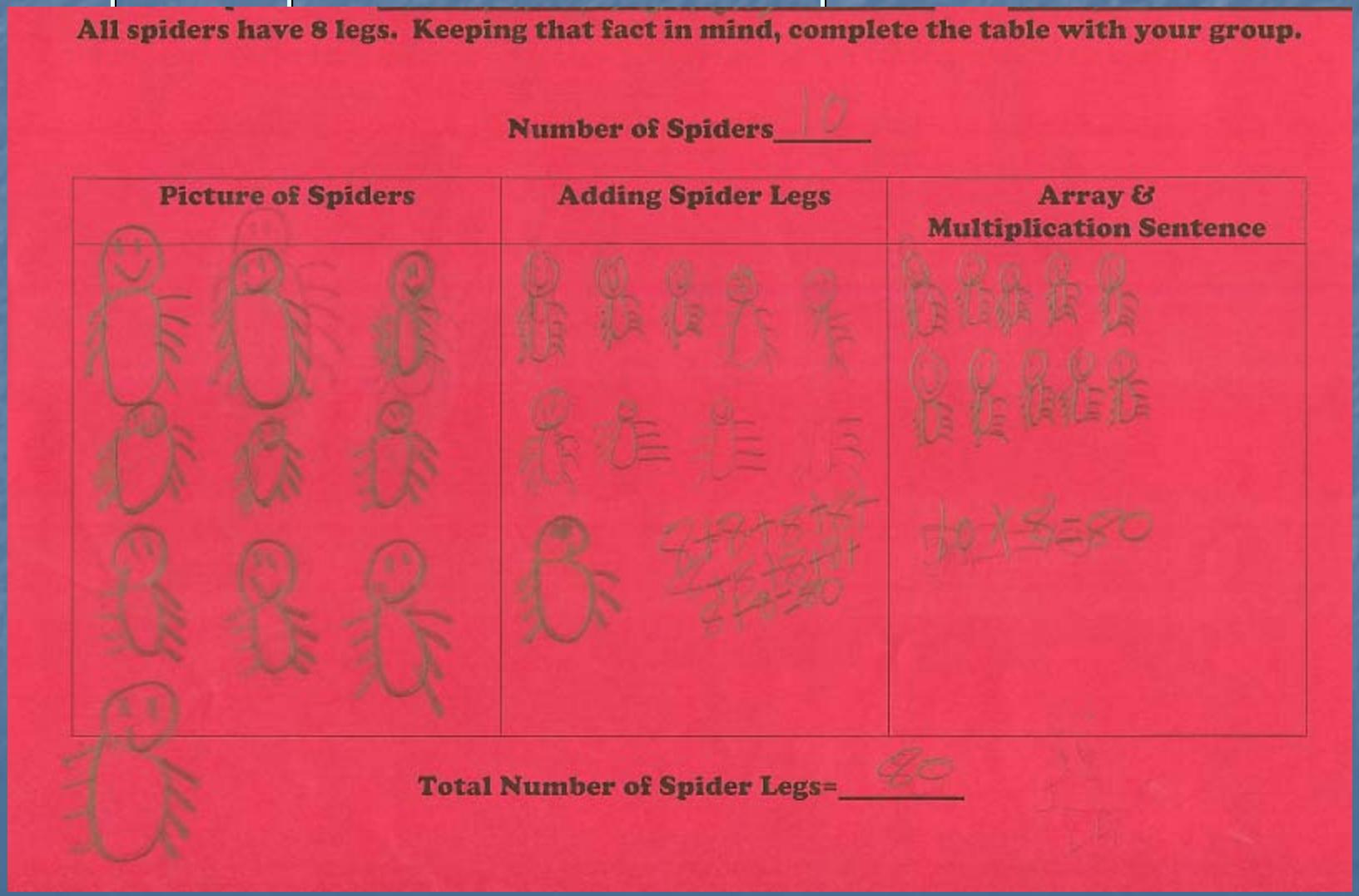
Social Studies

- The majority of the indicators in social studies address conceptual knowledge and fall under the second category of cognitive processing (understanding).

Using Cognitive Levels in Instruction

- Conceptual understanding
- Knowledge (automating)
- Application
- 3-2.7 Recall basic multiplication facts through 12 x 12 and the corresponding division facts.

3-2.10 Generate strategies to multiply whole numbers by using one single-digit factor and one multidigit factor.
3-2.11 Use basic number combinations to compute related multiplication problems that involve multiples of 10.



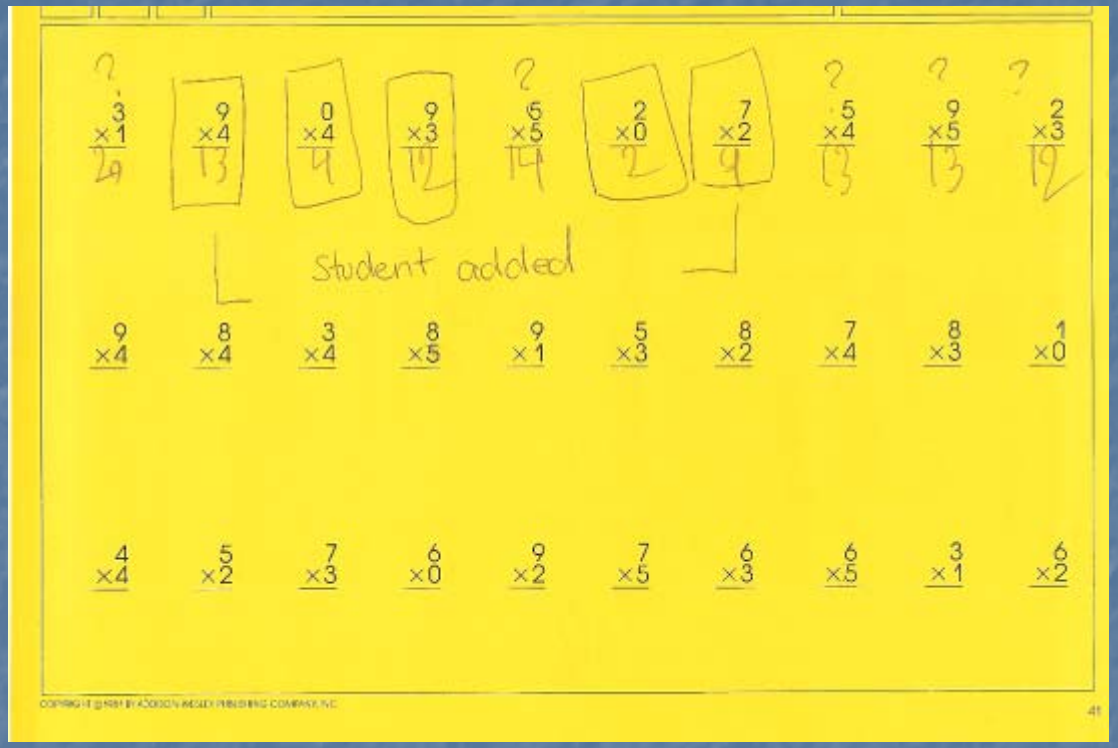
All spiders have 8 legs. Keeping that fact in mind, complete the table with your group.

Number of Spiders 10

Picture of Spiders	Adding Spider Legs	Array & Multiplication Sentence
		10 x 8 = 80

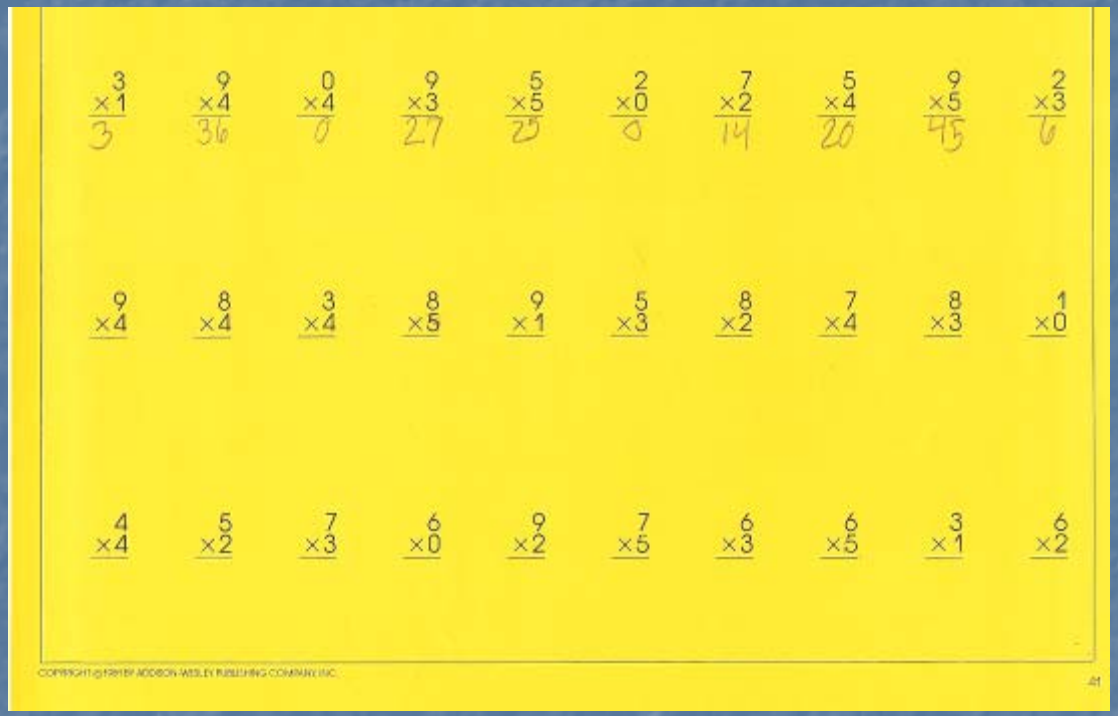
Total Number of Spider Legs= 80

Recall



Student does not have conceptual understanding of multiplication and has not memorized multiplication facts.

Recall



3 × 1 = 3	9 × 4 = 36	0 × 4 = 0	9 × 3 = 27	5 × 5 = 25	2 × 0 = 0	7 × 2 = 14	5 × 4 = 20	9 × 5 = 45	2 × 3 = 6
9 × 4	8 × 4	3 × 4	8 × 5	9 × 1	5 × 3	8 × 2	7 × 4	8 × 3	1 × 0
4 × 4	5 × 2	7 × 3	6 × 0	9 × 2	7 × 5	6 × 3	6 × 5	3 × 1	6 × 2

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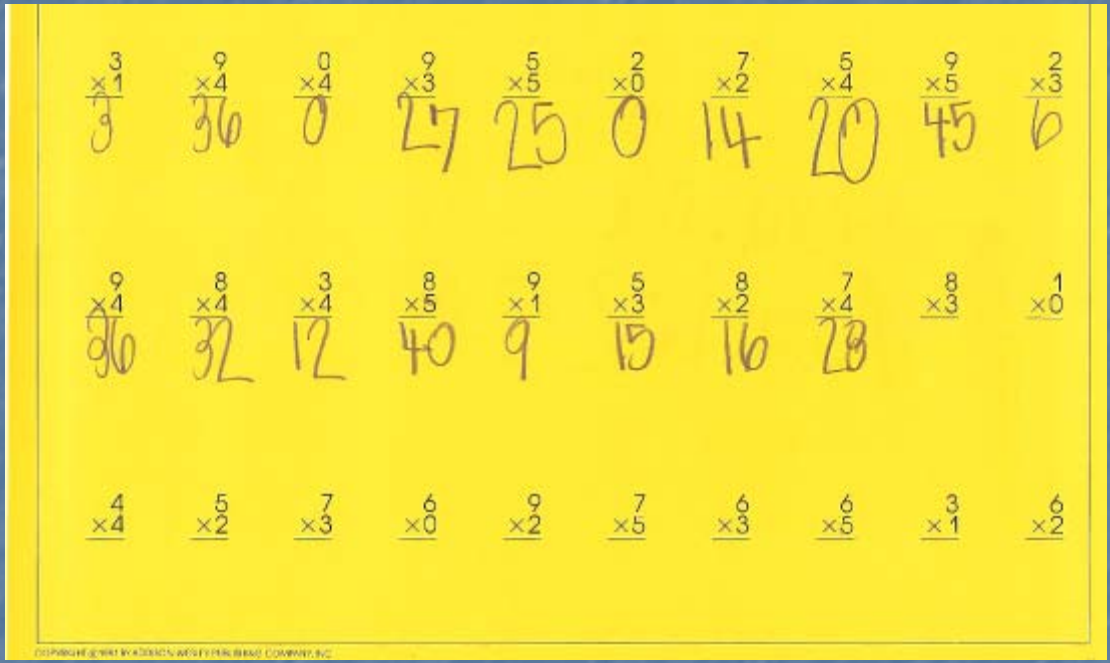
Student can slowly recall and is accurate. Increased time will provide more information – continue to automate

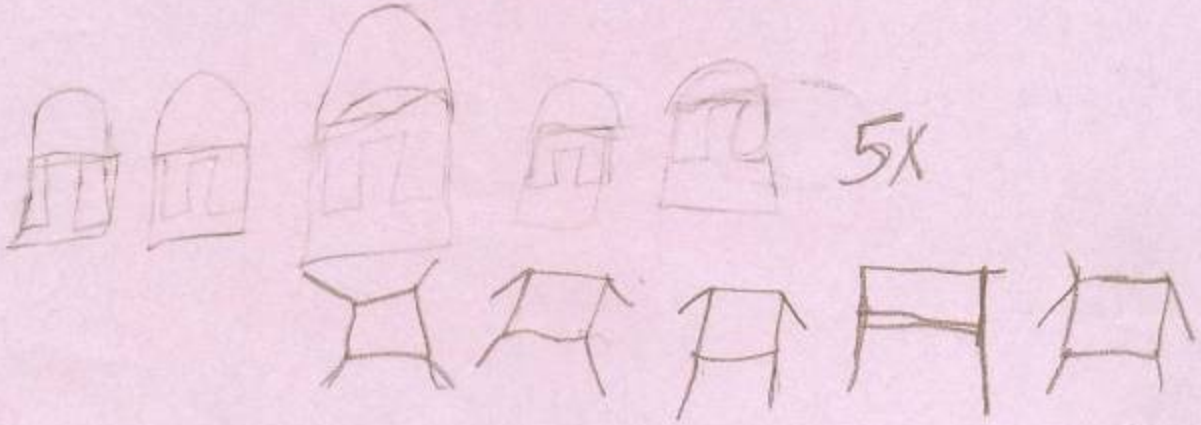
Recall



Student can slowly recall and is accurate. Increased time will provide more information – continue to automate

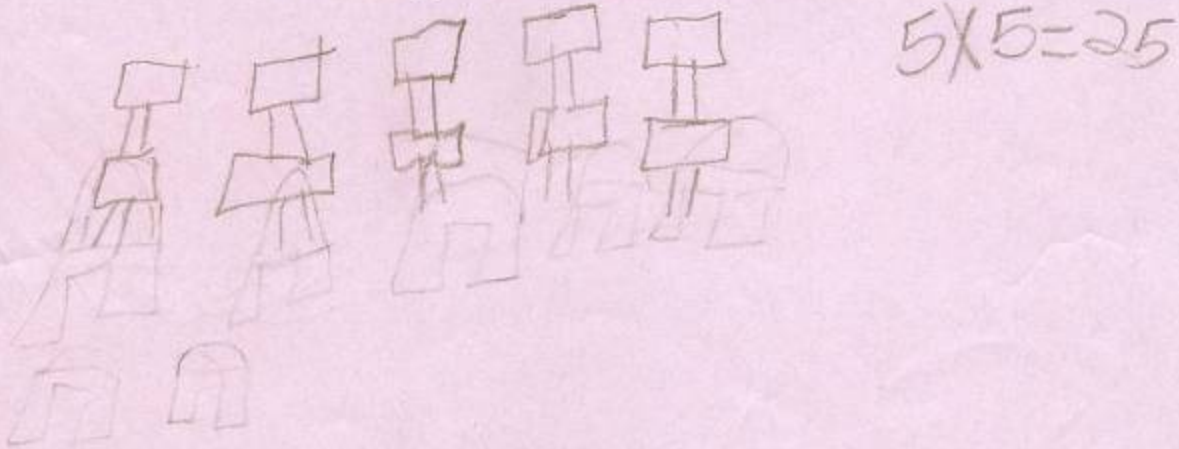
Understand

I Can Figure This! Solution #1



Sam needs 25 chairs in all.

I Can Figure This! Solution #2



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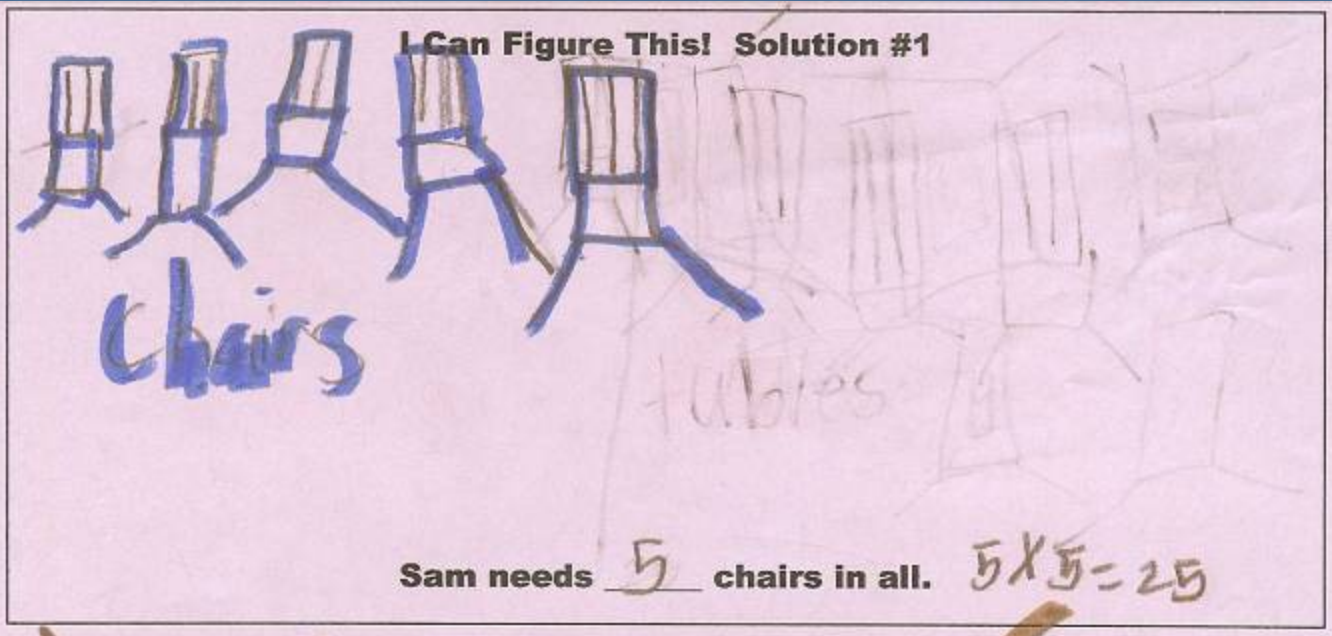
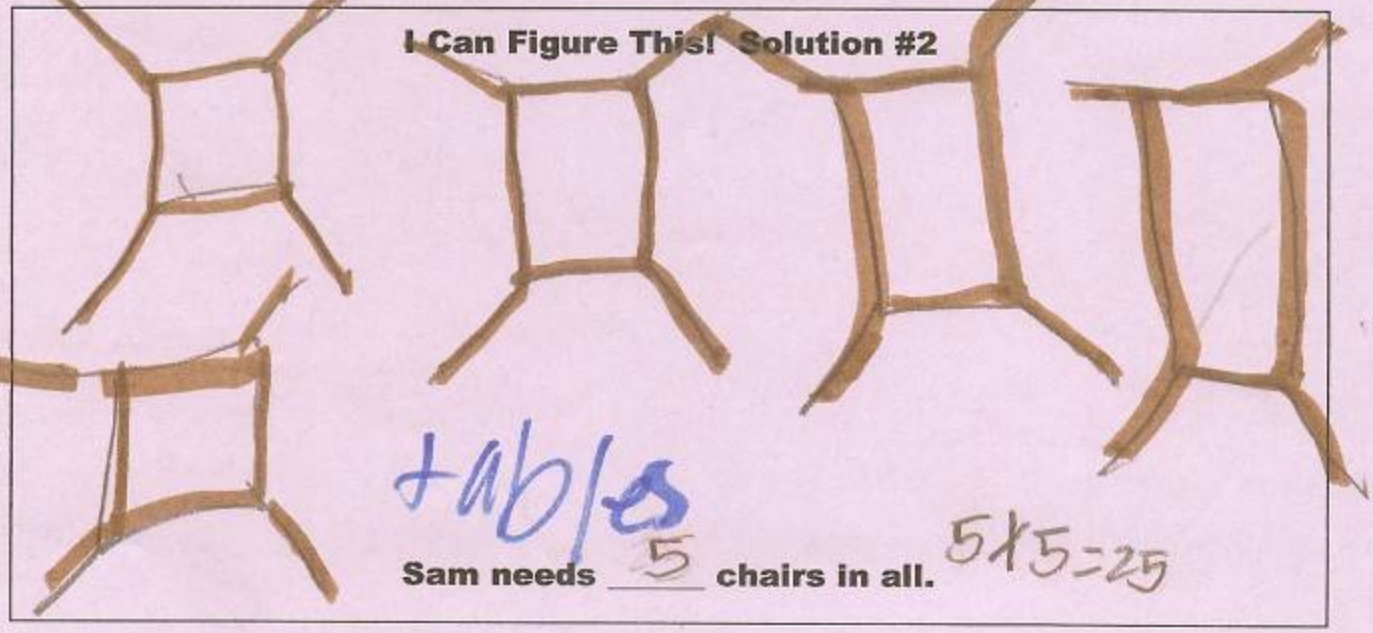
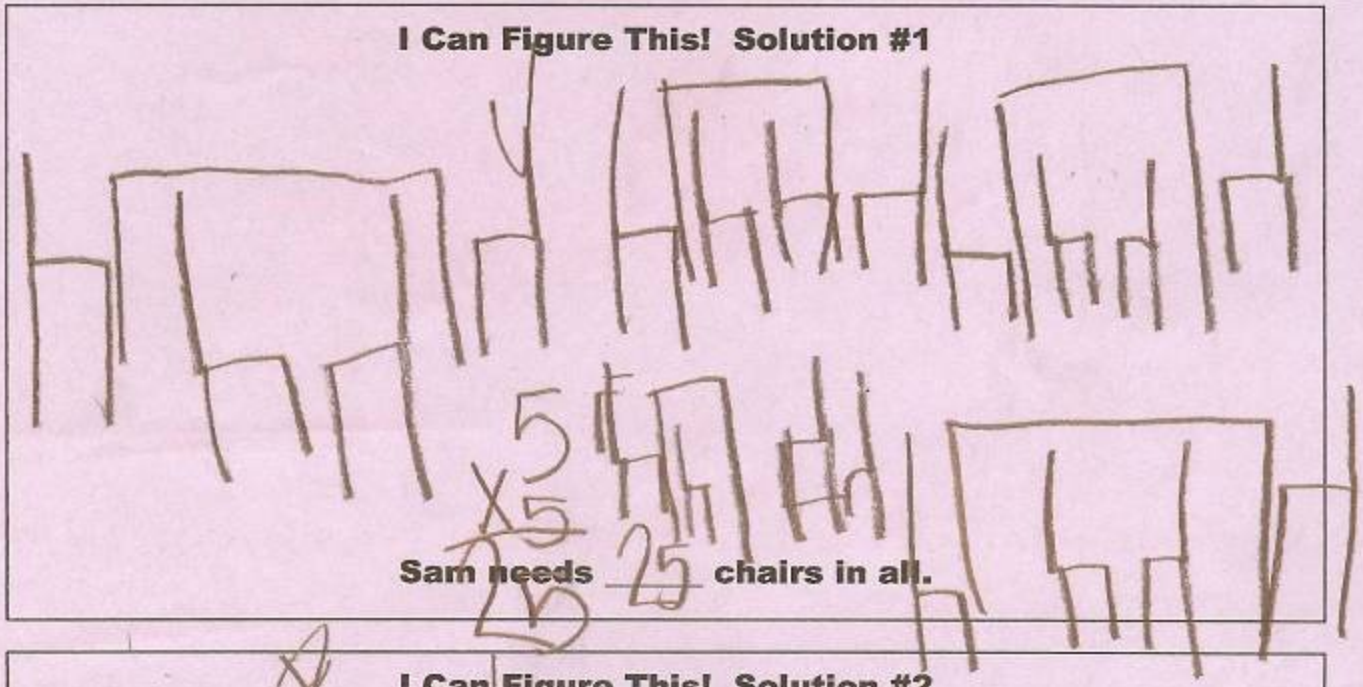

I Can Figure This! Solution #1
chairs
tables
Sam needs 5 chairs in all.
5x5=25


I Can Figure This! Solution #2
tables
Sam needs 5 chairs in all.
5x5=25

Diagnosis

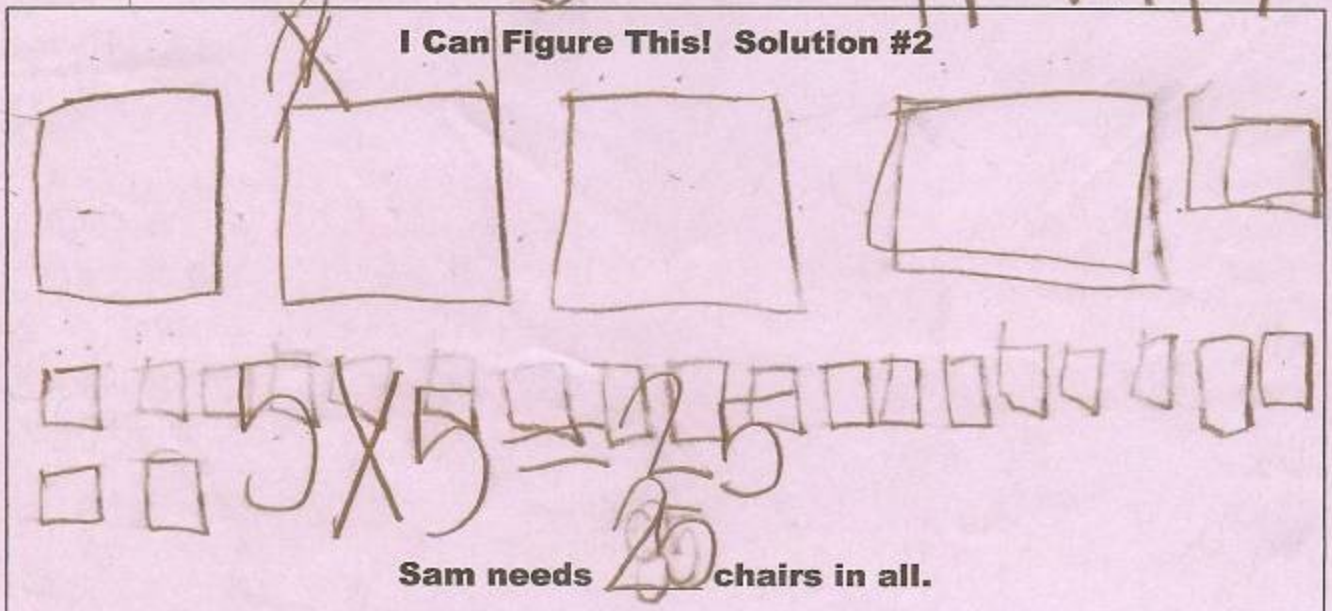
- Students know they should draw tables and chairs but don’t have a concept of how to approach the problem
- Students recall 5x5=25
- Students should work on illustrating what the 25 represents (chairs)

I Can Figure This! Solution #1



Sam needs 25 chairs in all.

I Can Figure This! Solution #2



Sam needs 25 chairs in all.

I Can Figure This! Solution #1

10

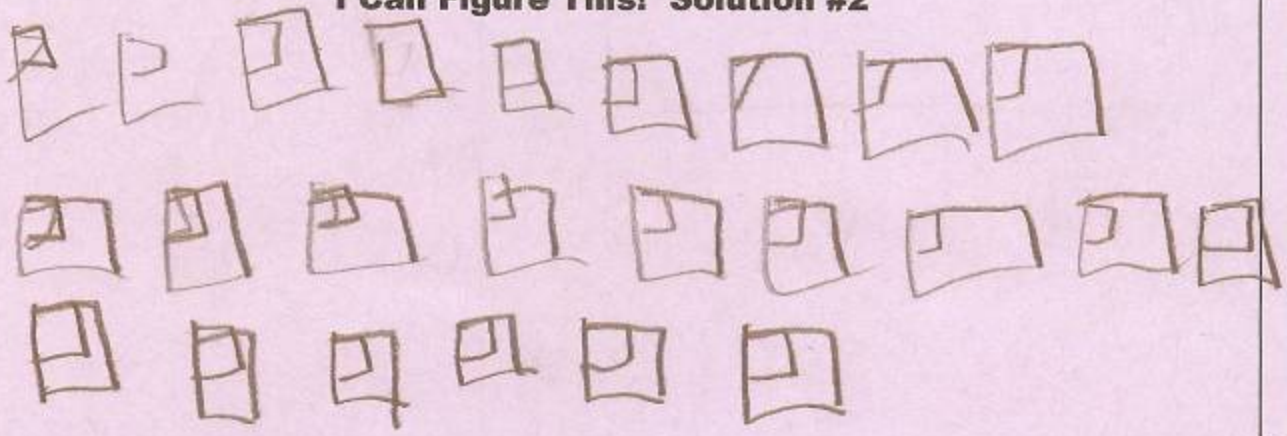
10

5

25

Sam needs 25 chairs in all.

I Can Figure This! Solution #2



9

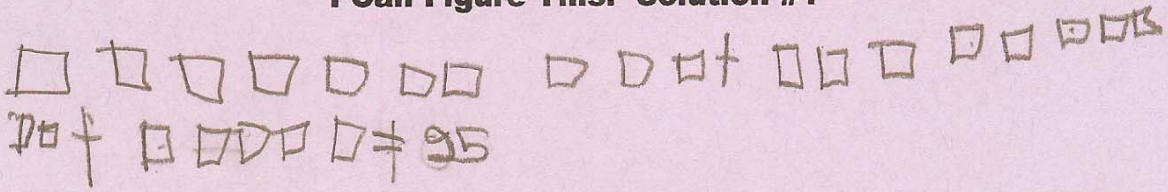
9

6

24

Sam needs 25 chairs in all.

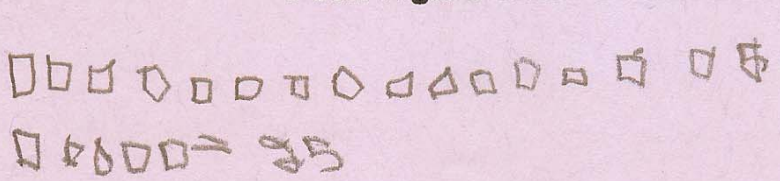
I Can Figure This! Solution #1



shows 10 + 10 + 5 = 25

Sam needs 25 **chairs in all.**

I Can Figure This! Solution #2



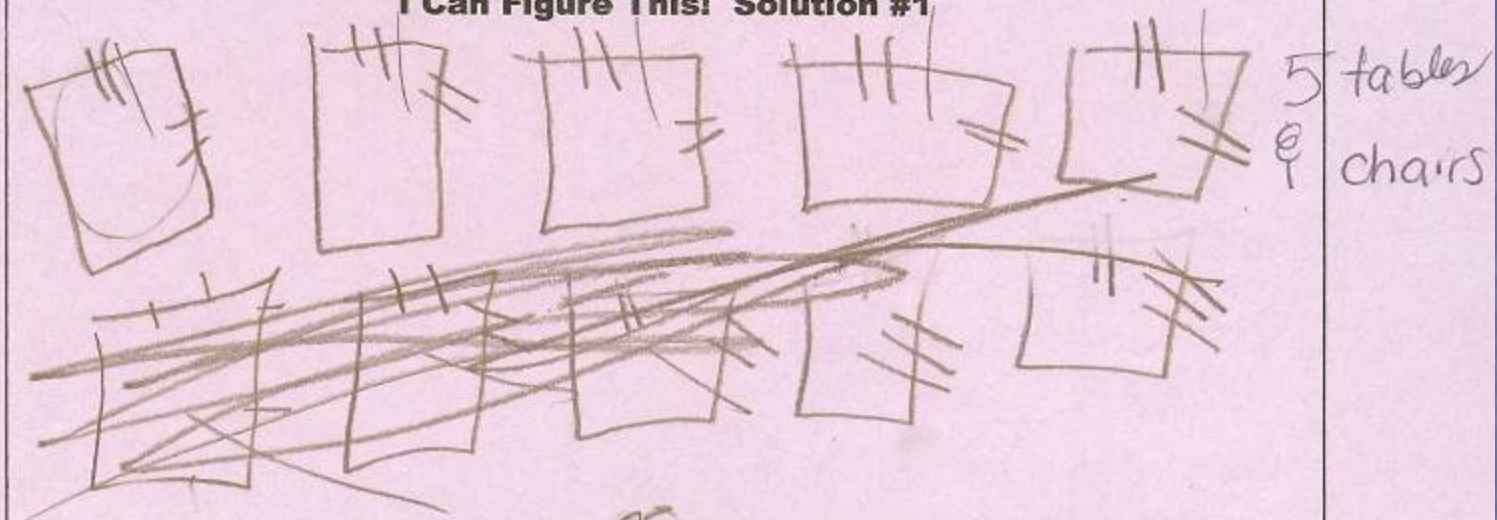
shows 20 + 5 = 25

Sam needs 25 **chairs in all.**

Diagnosis

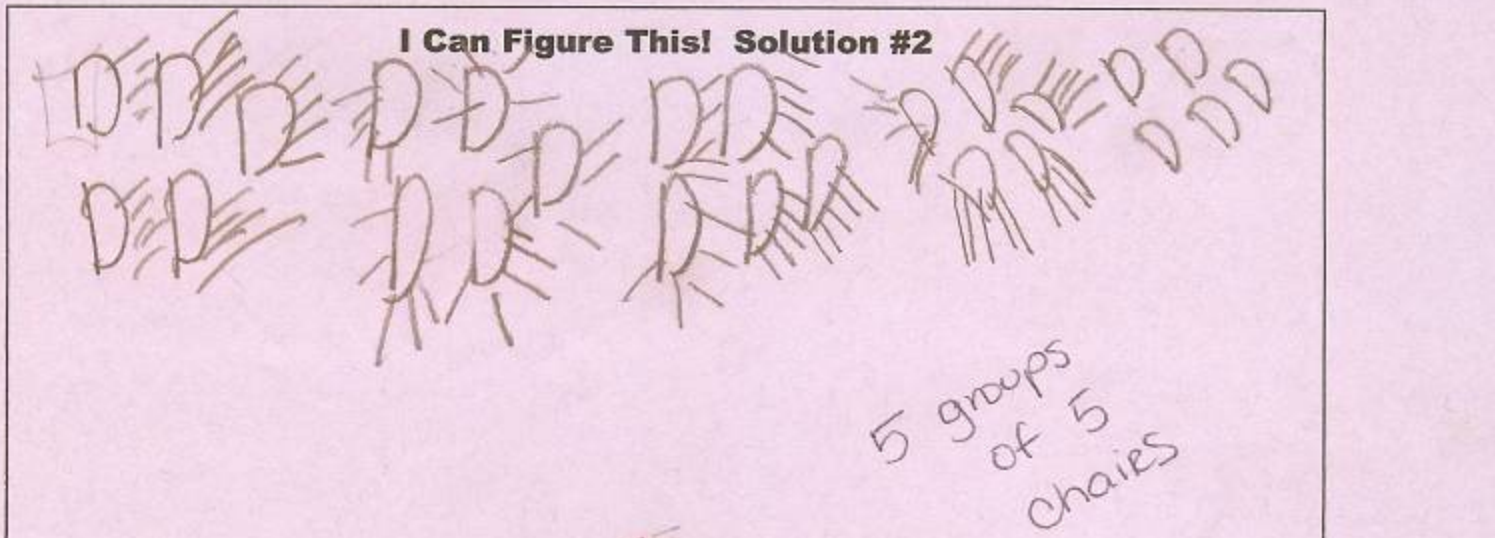
- Each student has memorized 5X5=25. Because this question is presented in a multiplication unit, each student answered correctly.
- Students are beginning to conceptualize multiplication. Students show they understand the goal of the word problem; they know they need 25 chairs; however, they did not group chairs.
- Continue to have students illustrate meaning of a product and model the multiplication conceptualization (tables and chair combination) for them (or pair with other students who can do so)

I Can Figure This! Solution #1



Sam needs 25 **chairs in all.**

I Can Figure This! Solution #2



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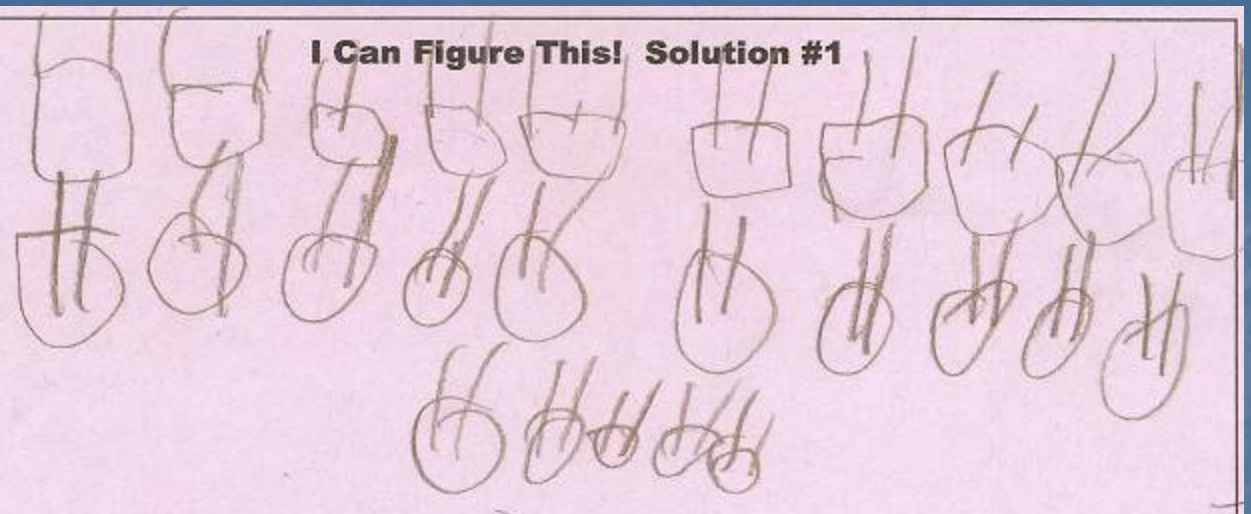

Sam needs 25 chairs in all.

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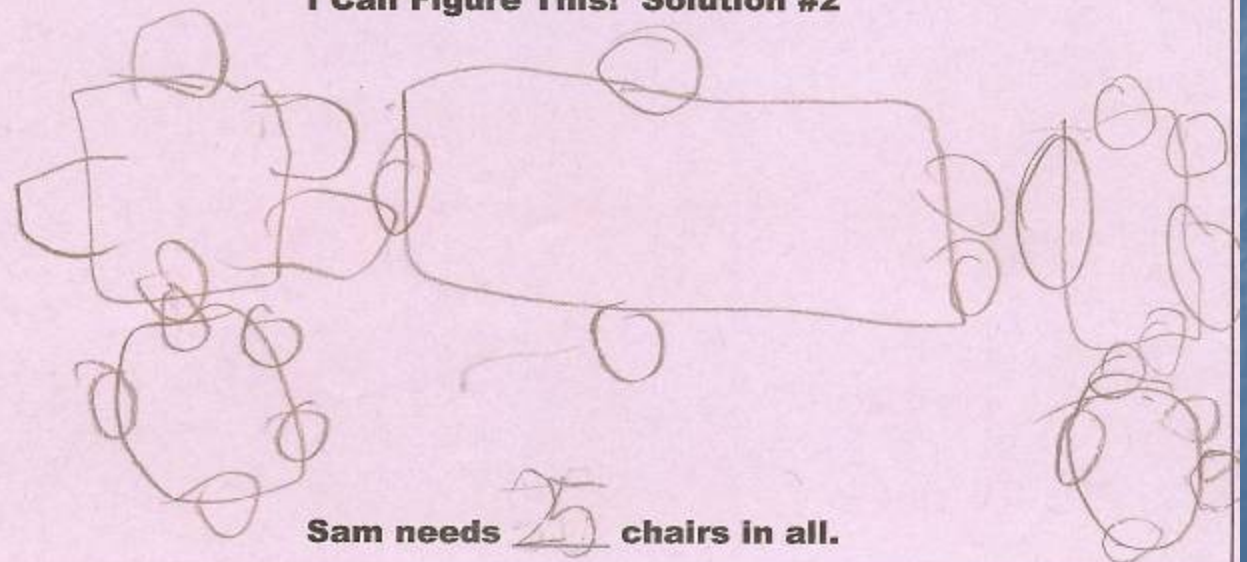

Sam needs 25 chairs in all.

Diagnosis

- Students have memorized 5X5=25.
- Students have conceptual understanding of multiplication.
- We don’t yet know if students can analyze a problem to determine if multiplication is needed or if they applied the procedure correctly in a multiplication unit.
- These students need to be presented problems that require varied operations.
- These students are ready to move to generate strategies to multiply whole numbers by using one single-digit factor and one multidigit factor.