License Plates

On a recent car trip we looked for license plates that had 3 numerals on them. Show all of the license plates that we found that had numbers that added up to 6.

Explain all of your work using pictures, numbers and words.

Grade Levels Pre-K-2

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Context

Many children like to play car games when traveling, and are very aware of license plates. This activity may be used in an addition unit that involves three-digit addition. In this task, the numerals represent individual addends, and do not represent their place value.

What This Task Accomplishes

This task assesses students' conceptual understanding of three-digit addition. It also identifies students who have a clear understanding of the commutative property of addition. Since solutions vary in terms of the way numbers are arranged, children's knowledge of place value is assessed. There are many solutions to this activity, so it will indicate children who are organized and able to communicate their thinking.

What the Student Will Do

Some students began by drawing cars with the license plates showing. They soon found it time consuming, especially after realizing there are a lot of solutions. Many students drew rectangles to illustrate license plates. Some listed all the numerals that could be used in their solutions (0, 1, 2, 3, 4, 5, 6). Finding some three-digit combinations to add up to six was fairly easy for most of the students, but it was more difficult to organize the work to try to find all solutions. The children were encouraged to use diagrams, numbers and words to indicate their mathematical thinking.

Time Required for Task

45 minutes

Interdisciplinary Links

This task works well with a social studies unit on geography, maps or travel. It can fit into any unit that involves a field trip, making a fun bus game. A mini-unit on license plates can be done where students determine the typical license plate in the school's parking lot, design their own license plates and/or visit your local Department of Motor Vehicles. Art projects may include doing license plate rubbings, and then sorting, ordering and classifying them.

Teaching Tips

Set the stage for this activity with students. Talk about going on a trip and thinking about a game to play in the car or bus to make the trip more fun. Ask if anyone knows any license plate games. Discuss what a license plate looks like. Some have letters, some have numbers and some have letters and numbers. If possible, go visit a parking lot and look at license plates.

In this activity, the children need to think of different license plates that could contain the same numerals. Some will ask if zero is a number and some will ask if the numbers can be in different order. This is an excellent time for students to "discover" the commutative property for themselves. Have them try 3 - 0 - 6 and 6 - 0 - 3 for example. Ask them what they discover. Use numbers other than those that equal six so that some of the solutions to the task are not revealed.

Encourage the child to explain how the problem was solved. If the child is capable of expressing him/herself in writing, then the child is to do so independently and the paper stands by itself. If the child is unable to write his /her thinking, then the teacher (or "scribe") must elicit the child's thinking or explanation without coaching.

Suggested Materials

- Pencils
- Paper
- Numeral cards
- Tiles
- Manipulatives
- Number stamps
- Stencils

Possible Solutions

6 - 0 - 0
0 - 6 - 0
0 - 0 - 6
5 - 1 - 0
5 - 0 - 1
0 - 5 - 1
1 - 5 - 0
1 - 0 - 5
0 - 1 - 5

4 - 2 - 0
4 - 0 - 2
2 - 4 - 0

0 - 4 - 2
2 - 0 - 4
0 - 2 - 4
4 - 1 - 1
1 - 4 - 1
1 - 1 - 4

3 - 3 - 0
3 - 0 - 3
0 - 3 - 3
3 - 2 - 1
3 - 1 - 2
2 - 3 - 1
1 - 3 - 2
2 - 1 - 3
1 - 2 - 3
2 - 2 - 2

Benchmark Descriptors

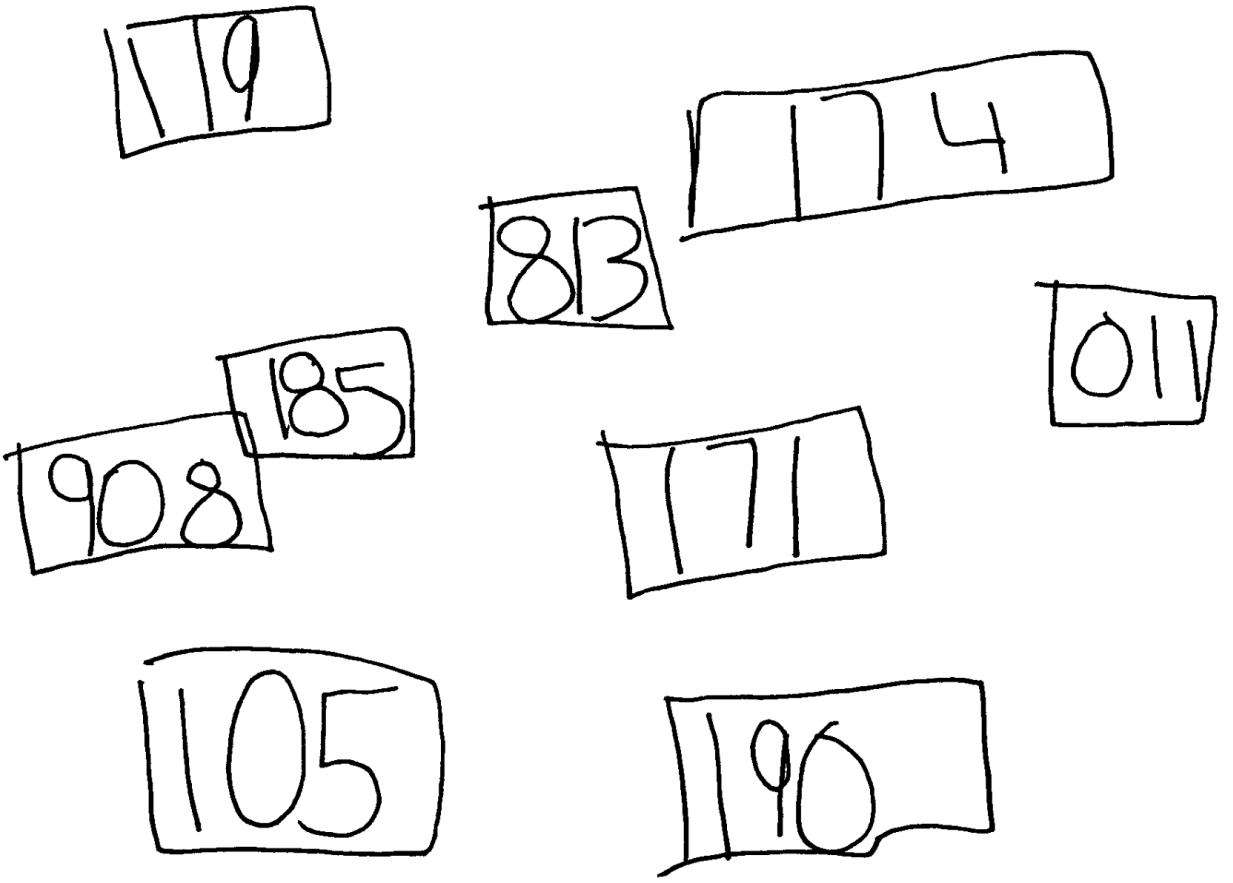
Novice
This response includes some accurate mathematical thinking and notation, but it seems to happen randomly and by coincidence. There is evidence of understanding the circumstantial situation, but not the mathematical situation.

Apprentice
This response shows rudimentary understanding of the mathematical situation. The student knew to find a sum of six, but made mathematical errors or used only two digits to arrive at that sum. There is evidence of mathematical reasoning and representation, but the student could not carry out the mathematical procedures. There is little communication of the procedures used.

Practitioner
This student fully understands the problem and found many correct solutions. Mathematical procedures were used appropriately with correct representation and notation. The strategy used to find the solutions was random trial and error, and in some cases, the solutions were repeated. The student kept "thinking up more numbers that add up to six."

Expert
This student found many solutions to the problem in a very organized manner. The strategy was more sophisticated in switching around all the numbers on one plate to make new plates, using "triples", then "doubles", then numbers that were different. The student indicated with number sentences that the numbers add up to six. The explanations are concise and clear as to how the student organized the problem and solutions. The student also makes mathematically relevant observations about his/her solution.

Novice



Two of the student's solutions are correct, but many are not.

The student shows no evidence of reasoning.

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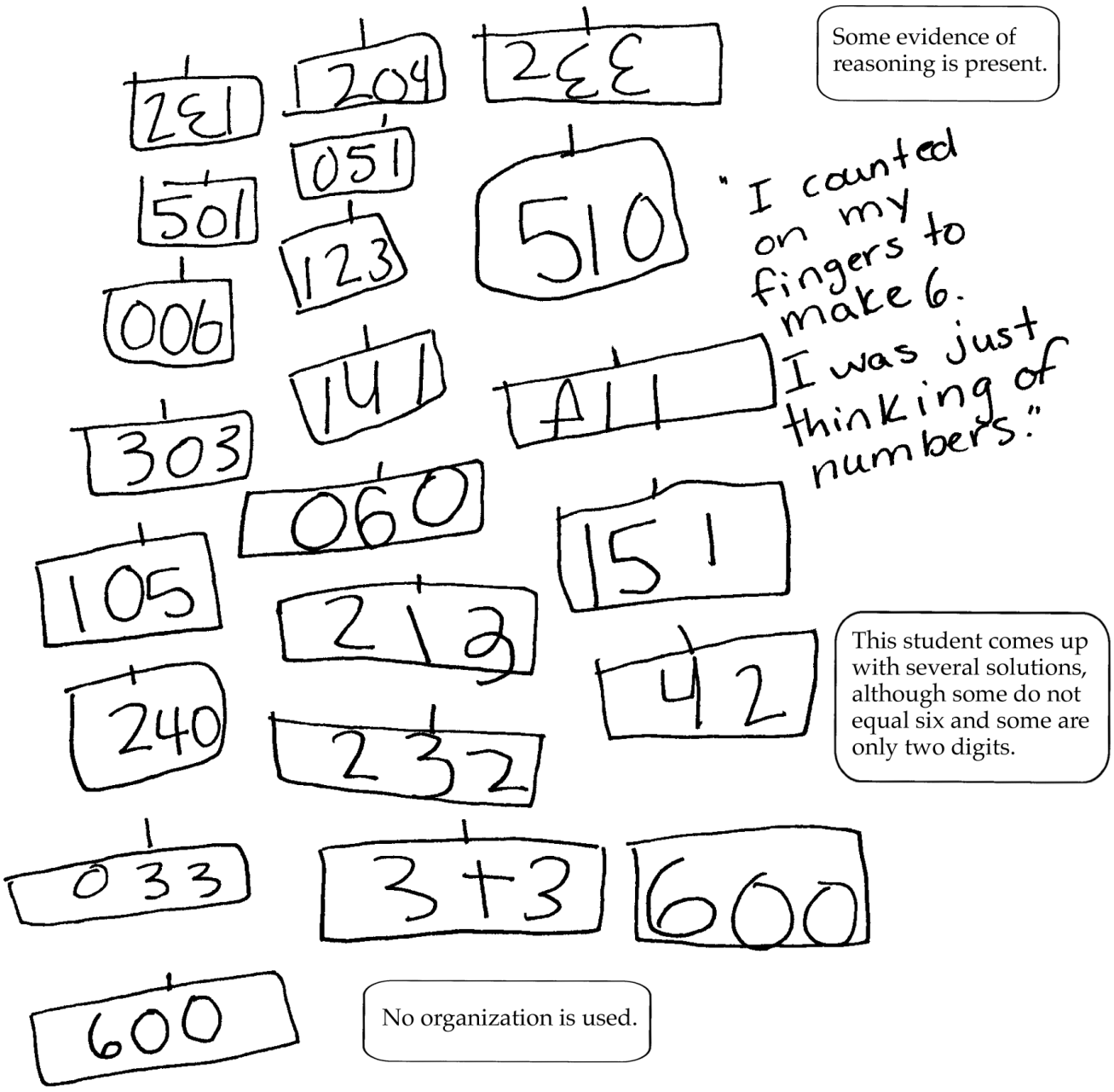
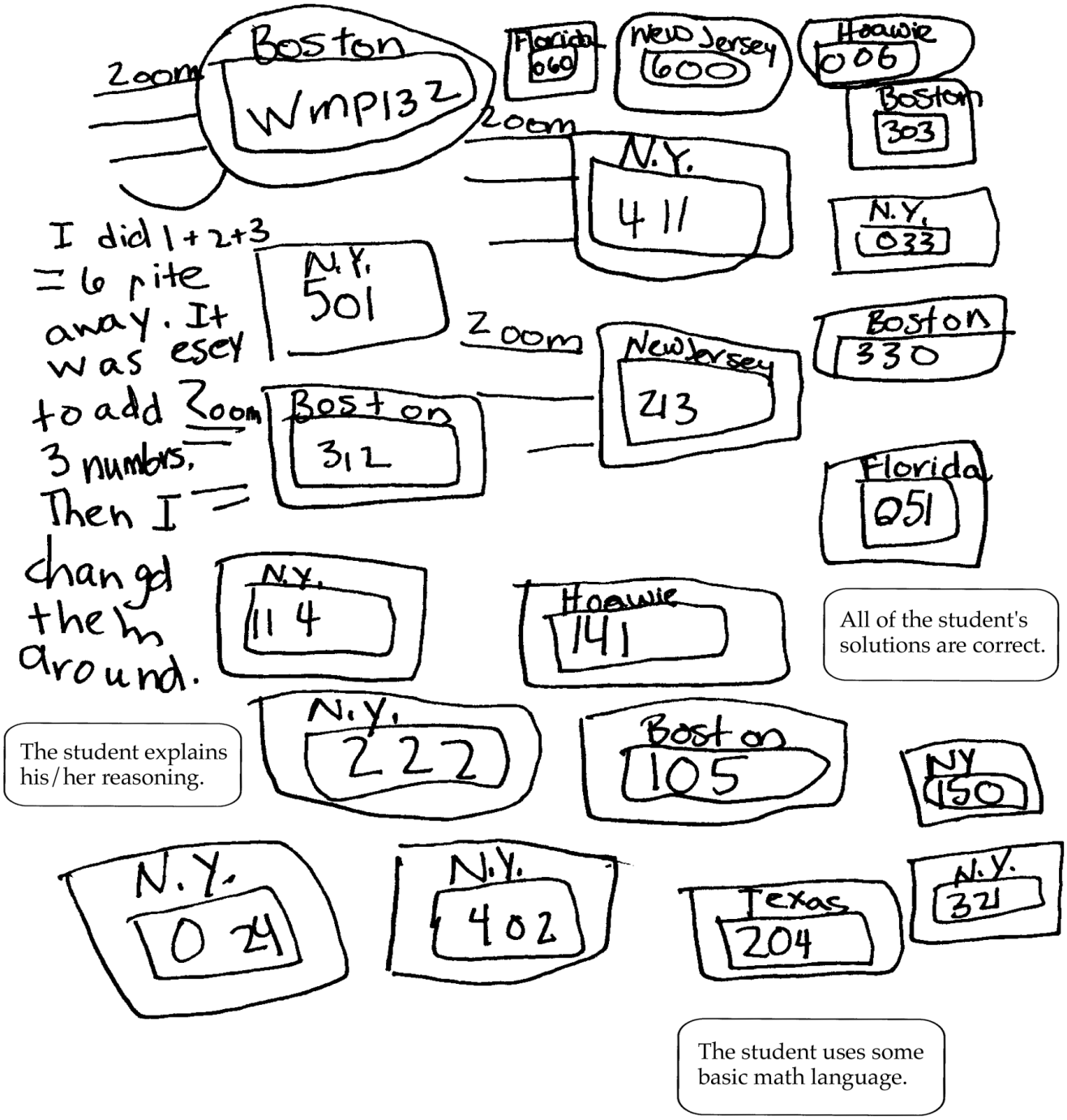
License Plates

Apprentice



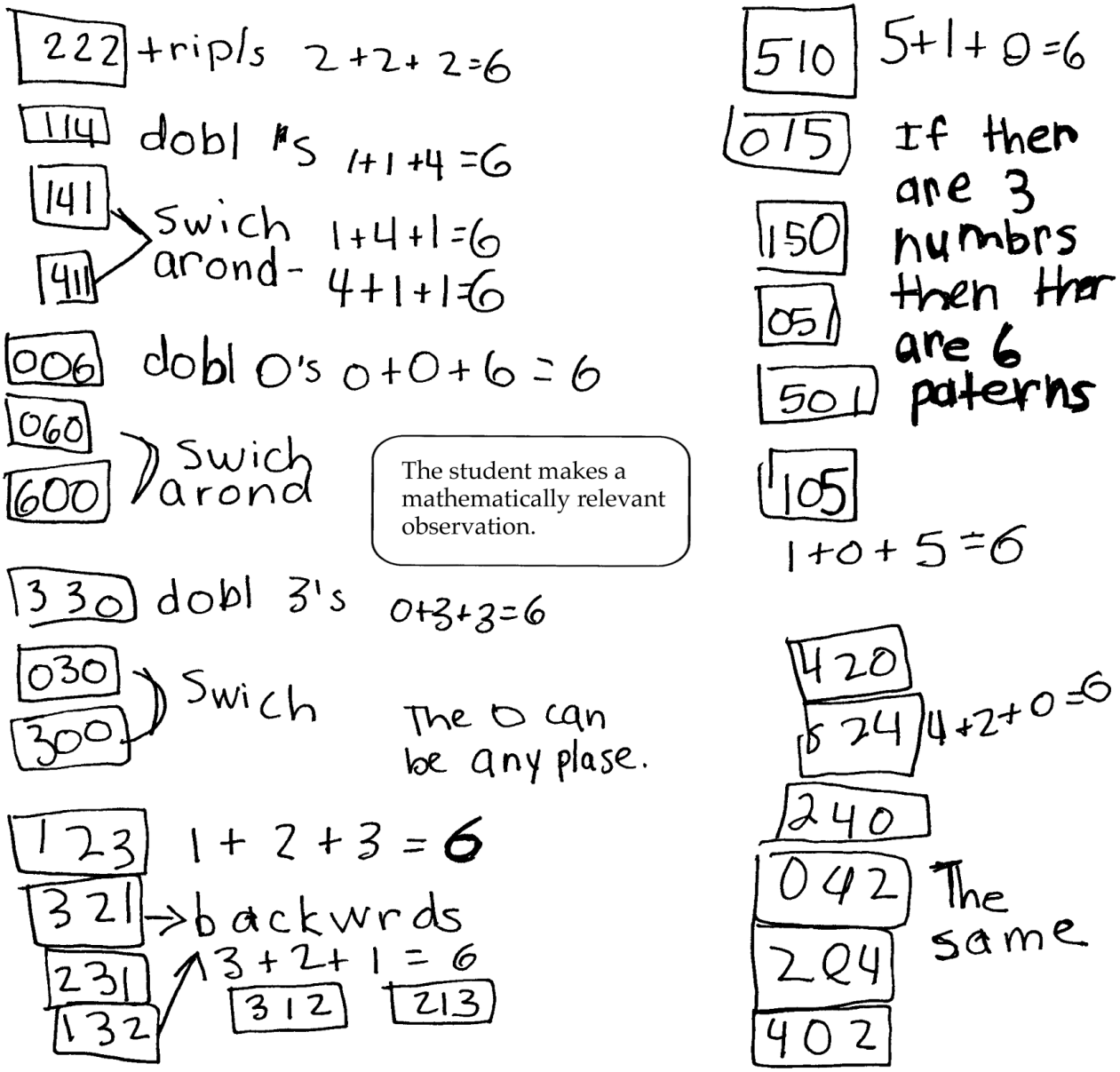
License Plates

Practitioner



License Plates

Expert



This student uses a systematic approach.

The student makes a mathematically relevant observation.

Student uses math language to communicate.

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