Part 1 Standard
Grade: Kindergarten
Domain: Operations and Algebraic Thinking
Cluster: Understand addition as put together and adding to, and understand subtraction as taking apart and taking from.
Standard: K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

Part 2. Explanation and Examples of the Standard
Explanation:
Kindergarten students will solve addition and subtraction problems presented in a story format up to 10.

Kindergarten students will work with four addition and subtraction problem situations: Add to result unknown; take away result unknown; put together/take apart total unknown; and put together/take apart both addends unknown.

Kindergarten students will solve word problems using groups of objects, drawings/diagrams or fingers.

Examples:
Addition and Subtraction Problem Types

<table>
<thead>
<tr>
<th>Add To Result Unknown</th>
<th>Take From Result Unknown</th>
<th>Put together/Take Apart Total Unknown</th>
<th>Put Together/Take Apart Both Addends Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calvin has 3 apples. His mom gave him 5 apples. How many apples does Calvin have now?</td>
<td>Yesterday I bought 8 apples. My children ate 5 apples. Now how many apples do I have?</td>
<td>Nathan has 6 red trains and 4 blue trains on his desk. How many trains are on Nathan’s desk?</td>
<td>Tyson has 9 cars. Some cars are blue and some are red. How many cars of each color might Tyson have?</td>
</tr>
<tr>
<td>3 + 5 = □</td>
<td>8 – 5 = □</td>
<td>6 + 4 = □</td>
<td>9 = □ + □</td>
</tr>
</tbody>
</table>
**Add To Result Unknown:** Calvin has 3 apples. Calvin’s mom gave him 5 apples. How many apples does Calvin have now?

Student: “I have 3 apples. I add five more. I count all the apples. Calvin has 8 apples.”

List:

1  2  3  4  5

**Take From Result Unknown:** Yesterday I bought 8 apples. My children ate 5 apples. Now how many apples do I have?

Student: “I have 1, 2, 3, 4, 5, 6, 7, 8 apples. The children ate 5.1, 2, 3, 4, 5 and I have 1, 2, 3. 3 are left.”

List:

1  2  3  4  5  6  7  8

**Put Together/Take Apart Total Unknown:** Nathan has 6 red and 4 blue trains on his desk. How many trains are on Nathan’s desk?

Student: “I drew 6 red trains and 4 blue trains. I counted them all there are 10 trains. “

List:

1, 2, 3, 4, 5
6, 7, 8
1, 2, 3, 4, 5
1, 2, 3
Put Together/Take Apart Both Addends Unknown: Tyson has 9 cars on his desk and some are blue and some are red. How many cars of each color might there be?

Student: “There are 8 red and 1 blue. I use the red side of the counters for red cars and one yellow for the blue”

Ten frames with double sided counters
Part 3, School Mathematics Textbook Program

Textbook Development:

Our district elementary schools use the textbook series Everyday Math.

Our four-year-old kindergarten math program introduces students to word problems (standard K.OA.2) in Unit 3 Operations. In this unit the students solve and create word problems by acting out the problem situation, either physically or with manipulatives within five. The children sing songs, which provide them with adding up and counting back experiences. The students also model and solve joining and take-away word problems through literature-based number stories. For example: the teacher reads the story The Mitten. After reading the story, the teacher gives the students word problems based on the story, which the children act out using a large blanket. In a teacher lead small group, the children are introduced to add to and take away word problems using manipulatives. In activities O-4 and O-5 students are introduced to the concept of add to and taking away word problems with bear counters and building blocks.

In the five-year-old kindergarten math program, students are introduced to word problems in section 2 and are included in other activities in the math program. At first students are introduced to stories with numbers using everyday language. For example, Mary and Jane are wearing blue tops today. Joe is wearing a blue top too. How many children in class are wearing blue tops. Students are allowed to use counters or paper and markers or crayons to solve the word problems. Then as students become experienced with the simple stories math language is introduced. As students become familiar with the different problem types, they are encouraged to come up with their own word problems.

In section 4 students are introduced to addition and subtraction terminology and symbols using word problems and counters. Students solve addition problems in activity 4.4 using construction paper, crafts sticks and counters. The craft sticks have the addition symbol written on them. The craft stick is placed in the center of the construction paper. As the teacher tells a word problem, the students place counters on the left side of the craft stick to match the first number given in the word problem. Then the students place the remaining counters on the right side of the craft stick. Last the students remove the craft stick and slide the counters all together and figure out the total. Activity 4.11 has the students using a craft stick with the subtraction symbol to sweep the counters off the paper. Addition and subtraction word problems are also present in the Minute math book. These are quick word problems teachers can use when there are small spaces of time to fill. Theses problems are present in a situation where students can solve them using their fingers.

The first grade builds off what students have learned in kindergarten. The lessons begin with simple addition and subtraction word problems within ten and progress to word problems with larger numbers (standard 1.OA1). Word problems are also incorporated into the start of math lessons in “Mental Math and Reflexes” activities as well as in math boxes. Students are encouraged to use pennies, pictures, fingers and number lines to solve word problems.
Conclusions: Although Common Core Math Standards do not officially exist for four-year-old kindergarten; the Everyday Math curriculum program begins to develop students’ understanding of addition and subtraction by using objects to represent the problem (standard K.OA.2) in Unit 3 Operations. In the five-year-old kindergarten curriculum students solve word problems (standard K.OA.2), but the emphasis on word problems is found more in first grade (standard 1.OA1). First grade has word problems throughout each unit. Kindergarten only focuses on word problems in a handful of lessons. Comparison word problems are introduced in kindergarten, which we know are difficult for kindergarteners. Teachers need to be aware of this and need to remember it is an introduction and not an expectation. I found the word problems used in kindergarten and in first grade do not follow the progression of the Common Core addition and subtraction problem types. Everyday Math does not have the different problem types available for teachers. Having the addition and subtraction problem types available for teachers would allow them to create developmentally appropriate word problems for each student. It would be nice to see more kindergarten Everyday Math lessons or activities with word problems as a focus.

Suggestions: Teachers will need to become familiar with the problem solving types, which are developmentally appropriate for kindergarten students. Teacher will also need to be familiar with the other problem types. As students become fluent solving kindergarten word problems within 10, teachers will want to use larger numbers and the other problem types to meet the needs of each students. In addition, many of the word problem types given in Everyday Math lessons do not match the Common Core Kindergarten problem situations. Teachers will have to create problem situations for these lessons. The language and vocabulary in the Everyday Math program do not match the language in the Common Core Standard K.OA.2. For example, the term join is used in addition problems instead of add to. Throughout the Everyday Math program word problems are referred to as number stories. Teachers will need to make sure they are using the common core terms. There are activities throughout the kindergarten math program, which have the students adding and subtracting, i.e., Dice Roll game, but the activities do not include word problems. Teachers may want to look over these activities and incorporate word problems into the lesson or game. Teachers will need to make sure they are developing the math in each grade level that will be needed to reach the standards in the upcoming grade. All teachers will need to understand what is taught at their grade level is built upon in the following grade level.