I. Content: Describe **what** it is you will teach. **What is the content?**

Having now introduced division, we will now develop our skill of differentiating what operation is required for a variety of word problems. After students organize problems into categories according to operation, they will solve according to their choices. Finally, students will compare their decisions to their peers and defend their choices. Is it possible that a single problem fits into multiple categories according to how you interpret it?

II. Learning Goal(s): Describe what specifically students will **know and be able to do** after the experience of this class.

- SWBAT identify what operation is required for a specific word problem.
- SWBAT solve for an unknown quotient or product from problems written in the language of equal groups.
- SWBAT explain their reasoning using a variety of methods, including words, pictures, and the generation of multiple methods for solving a single problem.

III. Rationale: Explain how the content and learning goal(s) relate to your Curriculum Unit Plan learning goals.

Our second lesson continues to address the key **standard** of my unit, 3.OA.3 (listed below). Just as in the last lesson, we will model using equal groups, drawings, words, and alternative methods for solving. In addition, we will begin to address 3.OA.7 by working on our fluency, precision, and immediacy of response to multiplication and division number sentences.

In addition to addressing this content standard, the lesson will also address one practice standard, or **habit of mind**: (1) Make sense of problems and persevere in solving them. I am purposefully choosing questions that will make students wonder and have a healthy dose of frustration. I want them to work hard on deciphering the operations that are appropriate for these problems, because they will need this skill when they move to two-step problems. I noticed in my addition and subtraction work that they couldn’t decipher when what operation was appropriate, especially with two-step problems.

This lesson incorporates **literacy development** by asking students to distill mathematical information from word problems, as well as to detail their mathematical reasoning using words. We will further build our **community of learners** by working in heterogeneous pairs to help us through more difficult problems. Additionally, the multiplicity of models encouraged and valued allows a variety of students to not only survive but thrive!
IV. Assessment: Describe how you and your students will know they have reached your learning goals.

- Students will be informally assessed through their participation and cooperation with fellow mathematicians during both the lesson’s activity and discussion, especially with regards to their ability to agree or disagree with peers as to which operations are associated with which problems.
- Students will be formally assessed by their performance on the Sorting and Solving activity.

V. Personalization and equity: Describe how you will provide for individual student strengths and needs. How will you and your lesson consider the needs of each student and scaffold learning? How specifically will ELL students and students with learning disabilities gain access and be supported?

The strengths of individual students will be brought out and encouraged in several ways:

**High flyers** will have demanding extensions that demand depth (as opposed to more problems that they can complete quickly) to pursue their knowledge to the fullest extent. They will work in homogeneous pairs to work with students at their own pace.

Students who have an **IEP or 504** will have many scaffolds, including teacher conferencing, an expert example of all the models they could use to demonstrate their understanding of new mathematical concepts, and having the opportunity to explain themselves in writing, pictures, or orally. They will as always have preferential seating and repeated directions as necessary.

**ELLs** will benefit from many of the same scaffolds as students on an IEP or 504. In addition to these strategies mentioned above, I will emphasize the need to use the correct vocabulary and to reference our organizer whenever necessary (especially *product* and *quotient*). Furthermore, ELLs who have the opportunity to work with fluent English speakers will have the chance to encounter this new domain specific academic vocabulary employed by their peers. Finally, ELLs will engage with the same set of strategies that we have building on since addition, which doesn’t require any new acclimation or memorization. They must apply the same strategies to multiplication word problems as they did with addition problems.

**Auditory** learners will benefit by the repetition of our new vocabulary and old strategies. They will also benefit from talking with and listening to a partner in order to solve the word problems.

**Visual** learners are sure to benefit from the multiplicity of expert models that will be displayed
on the board. Finally, kinesthetic will be allowed to work on the rug or other open spaces as is deemed appropriate.

**VI. Activity description and agenda**

<table>
<thead>
<tr>
<th>Time</th>
<th>Teacher Activity</th>
<th>Student Activity</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00-0:10</td>
<td>I will model uncovering one of the word problems and deciding where it belongs using the strategies. I will model all of the strategies they can employ (number line, equal groups, array).</td>
<td>Students will observe the models and begin their work organizing the problems according to operation used. They will demonstrate their understanding through one of the strategies.</td>
<td>ELMO Sorting and Solving problems</td>
</tr>
<tr>
<td>0:10:40</td>
<td>I will pair students into their math groups and then conference with groups as needed as they work.</td>
<td>Students will complete their sorting and solving activity.</td>
<td>Same as above</td>
</tr>
<tr>
<td>0:40-0:60</td>
<td>I will lead a discussion about the way they sorted the problems and whether they agree or disagree.</td>
<td>Students will participate in a discussion. If time permits, we will turn these problems into fact families.</td>
<td>Same as above</td>
</tr>
</tbody>
</table>

I will have to emphasize clearly to the students that I want them to be thoughtful about which operation they chose in order to solve the problem. To do so, I will highlight step four of our Word Problem Strategies (Decide on an Operation). I will also model for them my thought process for selecting an operation with the example. Additionally, I will have to emphasize that they should categorize before they begin to solve; again, I want them to focus on what multiplication and division questions look like, and then and only then how we solve them! In order to make sure they aren’t rushing to solve and are being thoughtful about their operation selections, I’ll give them a stamp before they can move from categorizing to solving. Also, they’ll have to explain why they chose that operation at the end.

**VII. List the Massachusetts Learning Standards this lesson addresses.**

- **CCSS.MATH.CONTENT.3.OA.A.3**
  Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.¹

- **CCSS.MATH.CONTENT.3.OA.C.7**
  Fluently multiply and divide within 100, using strategies such as the relationship between
multiplication and division (e.g., knowing that \(8 \times 5 = 40\), one knows \(40 \div 5 = 8\)) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

**VIII. Reflection**

This lesson was a total whirlwind. I’m glad that I started with a review of the vocabulary, with some extra time built in to complete our notes in our graphic organizers. I had noticed that students did not complete this section last time, so I took the opportunity to reinforce that (not so) new vocabulary. This also gave me the chance to point out that I had added their word problem strategies to the organizers; perhaps they’ll use it as a reference tool for their final assessment, where they will be writing their own word problems and solving them in their graphic organizers (extra points for using words like product in their sentences).

The meat and bones of this lesson was exhilarating. I am so glad that I split the classroom into groups, because their accountability for their partners’ learning was reinforced. Several times I relied on the language of partners to make sure that they were being thoughtful about their choices: i.e., “I’ve noticed that you both have chosen different operations. You know you need to agree to move on. Let’s work on figuring out whose method is more appropriate.” This also gave the classroom a nice buzz; I could tell which partners were actively engaged by whether they were talking or not. Some pairs were definitely more successful than others; Josephine and Jeremiah excelled and almost completed the entire packet. Some were stuck on question one or two. However, I did not want them to speed through! Separating the task of choosing an operation and solving the problem (and requiring them to have me check they did the former before they moved onto the later) excellently structured the students need to be thoughtful about their selection. To further achieve this, I am going to redistribute the envelopes with only the number of problems that they have solved correctly; if they are incorrect, they will be told to try another operation before they return to me for the rest of their problems (which will be waiting for them in a file). Also, having the papers in my hand will ensure that they are not moving on with misconceptions. It might cause a little bit of a backup in terms of a student queue, so I’ll enlist Patty’s help. I truly can’t wait to return to this activity, because the quality of their reasoning is so exhilarating. For example, Derrick wrote that he had chosen addition because the problem said “in all.” What a great use of context clues and his strategies! Yay!
EXTENSION OF LAP 3 to 10/31:

I did extend this lesson to span another day, just so we could complete more problems and have a discussion debriefing the multiple method of solving a single problem. I was worried for a bit that they would find the conceit of the envelopes and confidential theme to have worn out; however, they seemed eager to return to these questions. (Some even cheered to get their envelopes back!) After finding fewer problems in their packets than originally included, I believe they were doubly motivated to get through them. It almost turned the lesson into a bit of a race.

However, the alteration of holding their unsolved problems until they checked with me did make a small logistical nightmare for me, but it did focus their attention on a single problem that required a rigorous response. Indeed their responses were more focused and of higher quality. This is a testament to spending a longer amount of time on a few questions, in this case two whole math blocks on six questions. The students became deeply involved in the stories in front of them. I wish I could have had more bodies in the room to help me with the aforementioned paper storm; indeed this would’ve been a great rounds lesson. All groups had to work aloud to communicate and discuss their thinking; they had to formalize their thoughts on the paper; they also had to rethink their ideas in our discussion and consider the thoughts of others. As such, there were many methods of assessing the students’ rich understanding.

On one last practical note, I really liked how each student had their own paper with a line for their name on it. This made it very easy for me to grade each students’ individual work. For instance, Pam and Danielle worked together to get many correct answers; that being said, I know that Danielle’s understanding is more nuanced than Pam’s given the difference in their reasoning for solving the same problem, even though they chose the same method and achieved the same answer. In other words, there was a great deal of accountability for each individual student. This will definitely inform my groupings for future math lessons, as I can more accurately gauge the depth of their comprehension.

At the end, Patty paid me a very large compliment by asking for the materials for this lesson, saying that she wanted to use them in the future because the kids were so engaged. I’m on a bit of a high, as this really felt like hitting a home run. Without a doubt, I am so glad that we extended the lesson to give the students’ more opportunities to show their understanding. If I could do anything differently, I would have dedicated more time to our discussion, taking my time in showing a variety of student samples instead of just a few.