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

This math lesson provides a conceptual support for our understanding multiplication by making a foray into multiplication’s evil twin, division. By persevering through division problems written in the language of equal groups, we will reinforce our understanding of what it means to either increase or decrease a quantity. In order to concretize this conceptual work, students will be asked to demonstrate their knowledge using different models (equal groups, arrays, number lines, and skip counting). As an extension, students will write fact families for the questions they complete.

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

- 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.
- SWBAT demonstrate a developing understanding of the relationship between multiplication and division through fact families.

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). From the foundation we built in our last lesson, we will address a new element of the standard, specifically division. However, just as in the last lesson, we will emphasize two portions of this standard: the language of equal groups and the scaffolds of drawings, words, and alternative methods for solving.

In addition to addressing this content standard, the lesson will also address two practice standards, or habits of mind: (1) Make sense of problems and persevere in solving them, and (4) Model with mathematics. Surely students will have to struggle through the concepts of division word problems, as this is their first introduction to the topic; I want them to have, as Kyle would say, that good kind of frustration. However, working to represent the problem in many ways will help the students make sense of this work.

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.
- Students will be formally assessed by their performance on the Model Division worksheet.

*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 to pursue their knowledge to the fullest extent. Additionally, they will be challenged to work with students at a lower ability level in their thoughtfully created heterogeneous pairs, thereby reinforcing their own knowledge: **Know it? Show it to grow it!**

Students who have an **IEP or 504** will have many scaffolds, including teacher conferencing, working in heterogeneous pairs with students at a higher ability level, 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.

**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>0:00-0:15</td>
<td>I will lead the students through the first example. I will model on the board with equal groups, arrays, number lines, and skip counting.</td>
<td>Students will work through the first word problem and copy the models from the board.</td>
<td>Board, Marker, On Core book</td>
</tr>
<tr>
<td>0:15-0:40</td>
<td>I will pair students into their math groups and direct students to begin work on Page 22. I will remind them that they must show their solution using two models for each problem.</td>
<td>Students will work in pairs to complete their worksheet, using scrap paper as necessary to demonstrate with a variety of models.</td>
<td>On Core book, Scrap paper</td>
</tr>
<tr>
<td>0:40-0:60</td>
<td>I will lead a discussion on what strategy the class found most effective and least effective. I will prompt students to think about whether a strategy worked particularly well or didn’t work at all with any specific problems.</td>
<td>Students will participate in discussion, listening actively and contributing when prompted.</td>
<td>Same as above</td>
</tr>
</tbody>
</table>

This lesson as a whole was a challenge to conceptualize, given that Patty asked me to build off of a more traditional lesson. This is the reason that I am teaching from the book. I think that the students may have difficulty working in the space provided by the On Core book, but I have tried to weave in lots of best practice (expert modeling, different methods of demonstrating understanding, working in pairs, debriefing as a whole group and discussing strategies using the language of accountable talk). I hope that this will provide them the space to grow and shine!

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
VIII. Reflection

As mentioned above, this lesson was troublesome to craft. Originally, I had planned to return to my extension problems from our first lesson, working in pairs to answer all problems and then discussing as a whole group our various strategies. Unfortunately, I had to table this plan temporarily. Patty asked me to do something more traditional for my lesson, so I had to massage some best practice into an on-core activity. I must admit that I felt pretty good about this lesson, even though it wasn’t what I originally thought it would be.

In order to satisfy both Patty’s request and the rigors of WOK Math class, I used the questions presented in the On Core book. This was actually a good tactic, as the students were familiar with the set-up of the book and were comfortable working with it. Doing this allowed me to teach my math during our morning math block, which is much longer than the slot Patty and I have worked out for word problems in the afternoon. As such, I spent over a half hour working with the kids on the various methods of solving the problem. By showing them the multiplicity of ways to represent and solve the problem, I modeled the options they could employ themselves for the rest of the word problems. By the time we got to our second example, students had the language to direct me through the problem on the ELMO with very little prompting. Additionally, giving them these options side-by-side allowed me to demand that students use each method at least once and to demonstrate using multiple methods wherever possible.

I hoped that students would see that they had multiple options to solve a problem. My interaction with Josephine clearly demonstrated that; for the first problem, which involved dividing a rather large number, Josephine attempted to solve it using a number line. This proved a difficult strategy, as she had to draw a very long number line. When I conferenced with her and her partner Jeremiah, they said that they were going to scrap the number line because it wasn’t working for them. As a debriefing at the end of our lesson, Josephine was willing to share this experience with the class; she explained that it was easier to use equal groups for that question, but she used the number line for the last problem because it asked you to divide a much smaller number. Such is an example of a student employing strategies to solve a particular problem at hand! Now all I’d like to do is go back and show them the division number sentences that go along with their representations. Being able to write the number sentence alongside their model and their answer will definitely be part of their next assessment.