Outline:

Comparison Bar Models for Multiplication and Division

- **Question 6** (1:00)
  - You could first try to solve the problem with unit cubes.
  - Connect the pieces for the jelly beans into a stick. Make as many sticks as you can with the pile that you have for the jellybeans that are the same size as the stick for the lollipops. Boys and girls, how many sticks do you think you are going to end up with? How do you know that?
  - Ask the children to lay the sticks side by side to compare the lollipop stick row with the jelly bean stick rows. This shows the students that the row would be too long, they would run out of paper showing every jelly bean.
  - Help the children to see how each unit represents a particular quantity, which saves space.
  - You want to students to understand that it is unnecessary to label the value of each equal unit.
  - Example question: What are my possible operations if I have two parts and I am looking for the whole?
- Steps for solving a problem:
  - **Step 1:** Read the problem together.
  - **Step 2:** Rewrite the question as a statement with a blank for the answer (direct students about what you want them to include in their sentence, reinforce grammar).
  - **Step 3:** Determine who or what is involved in the problem. Are you looking for a part or a whole? Are we comparing? Lead the students to find comparison language in a problem where a comparison model is used.
  - **Step 4:** Draw what is represented with the unit bar(s) and the unit bar(s).
  - **Step 5:** Adjust the unit bars, and fill in the question mark.
  - **Step 6:** Correctly compute and solve the problem.

- o **Step 7:** Write the answer in the sentence, and make sure that the answer makes sense.
- **Question 7** (20:25)
  - o With third grade, train the students to underline the question that will be rewritten. At the beginning, model the sentence for the teacher. You will know at which time you want to add an element for grammar for your class.
  - o Ask lots of good questions.
    - ▪ Do we have any wholes? Can we find any wholes?
    - ▪ How do you know that?
    - ▪ What do we know about the number of sheep?
    - ▪ Is there anything that is going to tell us that we would rather use a comparison model?
    - ▪ Even though we have two parts, we have comparison words that tell us to use a comparison model.
    - ▪ How many bars do we need?
    - ▪ What do the bars represent?
    - ▪ Does she have more sheep or more lambs? How many more?
    - ▪ We have seen that she has five times as many sheep as lambs. Boys and girls, is that what we are representing (in the model)?
    - ▪ What unknown piece are we looking for?
    - ▪ We have one number as we are ready to do our computation? Can we do this? Have we seen something like this before, can we recall what we can do? What do we know about all of these pieces? How many are there? What is the amount in the individual parts?
    - ▪ Does this seem like an addition or subtraction problem? Does it make sense to subtract?
    - ▪ How many sheep does she have? If she has 35 sheep and just 7 lambs, is that equal to a total of 42?
  - o The students' answers lead you to the next questions.
- **Question 8** (36:30)
  - o We can always get started, even when the problems get a little bit more complicated.
  - o Talk about the problem.
    - ▪ Who is this about?
    - ▪ What do they have?
    - ▪ Talk about collections.
    - ▪ Do they have the same number of coins in their collections?
    - ▪ Peter has more coins than Sam, do we know how many more?
    - ▪ Do you see wholes or parts?
    - ▪ How do you know it is a comparison model? Four times as many shows us this.
    - ▪ "Altogether" shows which number is the whole.
    - ▪ What do we know?

- How do I represent 4 times as many?
- What else do we know?
- How will we know when we get to the right answer? Start with the units we know.
- Is that my answer? Is that why I need?
  - ○ Train the students to work in their space from left to write and top to bottom.
  - ○ Your default is going to be the algorithm, but you should practice the various strategies to use with your students.

- **Question 9** (53:20)
  - ○ **Before we write our sentence, what do you notice about this? How many blanks will we have in our sentence? Talk to your neighbor about how we might write our sentence?**
  - ○ They both have gumdrops? Do they have the same amount of gumdrops? How many gumdrops do they have altogether? Are there any clues about who has the most gumdrops?
  - ○ Look for comparison words to determine that you need a comparison model.
  - ○ Do we have all the parts? Review if the problem is long.
  - ○ **Learning to look for, find, and solve for the unknown builds a bridge to algebraic thinking.**
  - ○ What do we already know about the units? We don't know the value of 1 or 3 units. If the students don't know, have the students talk about it. Give the students time to talk about it to build their confidence in answering the question.
- **Question 10** (1:06:45)
  - ○ These questions come after units where you have worked with your students on computation.
  - ○ Be sure to define terms (for example: population).

- o Make sure the question makes sense to the students. For example: What are Albany, Dover, and Newtown?
- o Ask the students for their examples of sentences.
- o What do we know in this problem? How many cities are we comparing and talking about? Do we know the total?
- o Is this going to be a part-whole or comparison model? How do we know? What in the problem told you that it is a comparison?
- o How many bars will we need? How will we label these bars?
- o You could ask grammar questions about capitalization of the proper nouns in this question.
- o What else do we know? How will you represent that Albany's population is 4 times Dover's population.
- o Work together to understand the compound sentence and the comparison of Newtown's population to either Dover's population or Albany's population. This is practicing reflective reading.