



## Singapore Math with Dawn Swartz

### Lesson 8: Part-Whole Bar Model for Multiplication and Division

#### Outline:

#### Part-Whole Bar Models for Multiplication and Division

- In multiplication and division, a number bond represents equal groups, which is key for part-whole multiplication and division bar models. One of the features in the bar is that there will be equal parts or equal units.
- **Question 1 (3:30)**
  - Units are individual pieces and yet they are part of a whole. Think of concrete ways to explain units as part of a whole (for example, inches on a ruler).
  - Train the children to include the label for the answer in the sentence.
  - Discuss the lengths of weeks and months with the children.
  - Teach the children how to divide the bar into odd amounts of units equally.
  - It is acceptable for students to write the value of the equal part in each box or just in the first box.
  - **After the bar is drawn, write what is known about one unit (1 unit = 40).**
- **Question 2 (16:00)**
  - This problem is selected for reading carefully to find the unknown in part-whole modelling for multiplication and division.
  - Ask students to share their sentences. Students need to hear well-constructed sentences, even in math.
  - “Same” is a key word in determining that the students are looking for equal units.
  - Example question: What is our question mark? How do we represent our other part? Where does our question mark belong? The number bond helps with these questions.
  - **To find one unit, write what is known (5 units = 40.50).**



#### Step by Step Model Drawing

1. Read the entire problem.
2. Rewrite the question in a declarative sentence leaving a blank for the answer.
3. Determine who and for what is involved in the problem. Label parts and whole.
4. Draw the unit bar(s).
5. Adjust the unit bars, and fill in the question mark.
6. Correctly compute and solve the problem.
7. Write the answer in the sentence, and make sure that the answer makes sense.



- **When the whole and one part are known, this is a division problem.**
  - Students can share different ways to compute the problem to determine how much is one unit.
- Example question: How do we know that [the answer] is right?
- Lead the children to learn to look at the numbers to determine how to do computation, which was taught in previous lessons.
- **Question 3 (26:30)**
  - It is helpful to cross out parts of the problem that have been accounted for.
  - Example question: If they will be equal bags of marbles, what does that tell us about the parts?
  - Have students picture the unit in the center when they are drawing an odd number of units on the bar model.
  - Use the number bond to go from the familiar to the new.
  - **If it is a problem with equal units, we start with the units we know** (3 units = 126).
    - Lead your students to look at the division problem. Talk about **rules of divisibility**.
  - Example questions: Does that make sense? How can we check? What if the next day, Jackson is given a bag of 58 marbles, how many will we have then?
- **Question 4 (35:14)**
  - Try to work through this problem on your own.
  - Example question: Where do you see another part?
  - Let students talk together during math. You should be asking a lot of questions and the students should be doing a lot of talking.
  - Example question: How might we label this bar? How many units do you need?
  - If the units are more than 10, we need another tool for drawing the bar model. Start with the first three, count back from the last three, and draw an ellipsis in the middle.

4. During the month of April, Barry ran 2.8 miles each day. How many total miles did he run in April?

miles run

1	2	3	...	28	29	30
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- Don't tell your students to move the decimal point. A decimal point does not move, it is always between the one and the tenths. What moves and changes is the value of the digit. As the value of the digit changes, it is renamed. We want the student to understand concepts.
  - Ten times eight tenths moves the eight into the ones place.

Make sure you work out bar modelling problems in advance of working through them with your class.