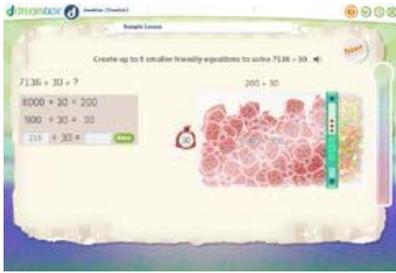# Division Within 10,000 with Remainders

The interactive white board tool for this lesson can be found on our website under Resources and Teacher Tools. ([www.dreambox.com/teachertools)](www.dreambox.com/teachertools)

This DreamBox lesson uses a packing context and partial quotients to help students understand multi-digit division conceptually, interpret remainders, and develop effective mental division strategies.

Sample Lesson

Objective: Students choose friendly equations (partial quotients) and use the distributive property to solve multi-digit division problems within 10,000 and interpret remainders.

Background: Students should understand multiplication, division and place value before this lesson. It is beneficial if they have used partial products to solve multi-digit multiplication problems prior to this lesson.

Instruction:

1. Bring up the DreamBox interactive white board lesson.

2. The teacher begins, "We need to determine the number of bags that are needed to package the gumballs in this problem. What do we know? What can we do?"
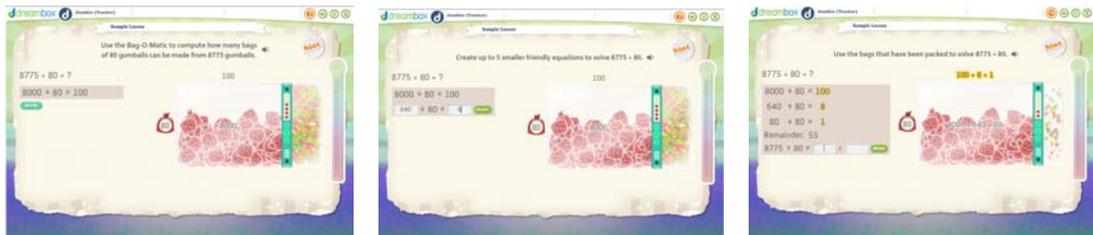   Possible responses:
    • "We know how many gumballs we can put in each bag."
    • "We know the total number of gumballs."
    • "We can find how many bags by dividing the number of gumballs by how many gumballs are in each bag."
    • "They've given us a division problem!"

3. The teacher states, "I'm not able to do this problem in my head, but I need an exact answer. I do know that I can solve this problem by using helper equations or partial quotients. The first step is to find an equation with a dividend less than 8775 that is divisible by 80. What would be your first equation and why? Discuss your equation choice with your partner."

Adapted from: Fosnot & Dolk. Young Mathematicians at Work: Constructing Multiplication and Division (Portsmouth, NH: Heinemann), 120-123.

After students have discussed possible strategies, the teacher asks one student to share, click the pack button and type their friendly equation.

Possible responses:

- "My first equation is 8000 ÷ 80 = 100 because I know that 80 x 100 = 8000."
- "I would use 8800 ÷ 80 = 1100 because I know 880 ÷ 80 = 11." (This response does not work because the dividend is too large. Allow the students to discover this when they type it in. Prompt the class to discuss what this means and how this helper could be used to solve the problem even though it can't be represented with these gumballs.
- "I would use 800 ÷ 80 = 10 because I know 80 x 10 is 800." (This response is not optimal, as students will see when the bagging machine animates; however, all strategies need to be honored. Discuss why this may or may not be a good strategy.
- "I would use 6400 ÷ 80 = 80 because I know the double 8 x 8 = 64 so 80 x 80 = 6400."

4. Continue to ask students to determine what the next equation will be. Students are able to use up to 5 partial quotients with this manipulative. Depending upon the equations that students choose, have conversations at each level to discuss what is 'easier or more efficient' and how each student chose his equation. Repeat this process until you are prompted to find the remainder.

5. Once students are prompted to find the remainder the teacher should say, "Great job! We've found all the partial quotients; however, we might have some gumballs left over. Do we have extra gumballs? If so, why? "

Possible responses:
- "Yes, we couldn't fill another bag full with 80 gumballs."
- "Yes, we were only able to make 109 bags with 8775 gumballs. We don't need all the gumballs to fill the bags, so some were left over."
- "We didn't have any left over, we're done." (If a student doesn't realize that there is a remainder, have a conversation going over the steps in reverse using multiplication.)

Adapted from: Fosnot & Dolk. Young Mathematicians at Work: Constructing Multiplication and Division (Portsmouth, NH: Heinemann), 120-123.

6. After discussing the concept of extra gumballs or the remainder, ask students how many gumballs are left over and have one volunteer type in the answer. Discuss how the remaining gumballs could be represented by either a whole number value or as a fraction of a bag. Make certain you discuss how each is an appropriate response depending upon the prompt.

7. There are multiple ways that DreamBox asks for a final answer once the remainder is found. Most of the time, the lesson asks for the quotient and the remainder as a whole number or fraction; however, on occasion, the lesson will also ask, "How many bags did you use to pack all the gumballs?" Have a conversation with your students about how to handle this situation practically. Discuss why we need that additional bag to hold the remaining gumballs, even if it isn't full.

8. After you complete this problem, click the next button to continue and repeat steps 1-7. As you work through the problems, encourage your students to explore different possibilities, even if the strategies aren't perfect. Facilitate the learning as opposed to modeling a particular strategy. Emphasize using "nice" numbers that are easy to work with mentally. Let your students learn from each other and use occasional errors as learning opportunities. Students should be encouraged to take risks and attempt new strategies.

Adapted from: Fosnot & Dolk. Young Mathematicians at Work: Constructing Multiplication and Division (Portsmouth, NH: Heinemann), 120-123.