Growing Place Value Understanding Through Explicit Instruction Using Enhanced Counting Routines

Subject: Mathematics / Place Value & Operations
Grade Level: 3rd Grade (Approx. Age 9)
Context: Designed for Classroom (22 students), Homeschool, or Small Group Training

Lesson Materials

- **For the Teacher:** Document camera (or large whiteboard), magnetic base-ten blocks (flats, skinnies, bits), "Zero Hero" master mat.
- **For Each Student/Pair:**
  - Base-ten blocks (1 cube/block for 1,000, 10 flats for hundreds, 20 skinnies for tens, 20 bits for ones).
  - "Zero Hero" Place Value Mat (Columns for Thousands, Hundreds, Tens, and Ones).
  - Dry-erase board and markers.
  - "The Great Exchange" Game Cards (Multiplication and Subtraction challenges).

Standards Alignment

- **AR.Math.Content.3.NBT.A.2:** Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- **AR.Math.Content.3.NBT.A.3:** Multiply one-digit whole numbers by multiples of 10 in the range 10–90 using strategies based on place value and properties of operations.
- **AR.Math.Content.3.NBT.A.4:** Understand that the four digits of a four-digit number represent the amounts of thousands, hundreds, tens, and ones (e.g., 7,706 can be portrayed in a variety of ways). Understand that 1,000 can be thought of as a group of ten hundreds.

Learning Objectives

I want students to understand THAT: Mathematicians use place value, grouping, and structure to choose efficient strategies when solving real-world problems involving addition, subtraction, multiplication, and division.

- **Skill 1:** Students will fluently skip-count backward across hundreds (e.g., 1,000 to 890) to identify the relationship between 10 tens and 1 hundred.
- **Skill 2:** Students will identify and correct errors in subtraction problems involving "borrowing" (regrouping) across zeros.
- **Skill 3:** Students will accurately solve a subtraction problem from 1,000 with 90% accuracy.

Success Criteria

- I can explain why 1,000 is the same as 10 hundreds or 100 tens.
- I can "unlock" a zero in the tens place by trading a hundred flat.
- I can catch a mistake in someone else's subtraction work and explain how to fix it.

I. Introduction: The Hook & The Objective (5 Minutes)

The Scenario: "Zero-Locked!"
"Imagine you're at the store to buy a Legendary Dragon toy. It costs 452 gold coins. You reach into your bag and pull out one huge 1,000-coin block. You look for smaller coins—the tens and ones—but your pockets are empty! You have zero tens and zero ones. Does this mean you can't buy the toy? No! You aren't broke; you're just 'Zero-Locked.' Today, we are going to become **Zero Heroes**. We're going to learn how to break that big 1,000-block into pieces so we can pay the exact change for anything!"

Learning Goal: Today, I will learn how to regroup across zeros using place value so I can solve any subtraction problem accurately.

II. Body: The "I Do, We Do, You Do" Model (35 Minutes)

1. "I Do": Enhanced Counting Routine & Modeling (10 Minutes)

- **The Routine (Count Around the Circle/Table):** "We are going to count backward from 1,000 by 10s. When we hit a 'Zero-Lock' (a flat hundred), we stop and talk."
  - Start: 1,000... 990... 980... 970... 960... 950... 940... 930... 920... 910... **STOP at 900.**
  - *Teacher Inquiry:* "We are at 900. To get to the next ten (890), what must happen to that hundreds digit? We have to 'break' a hundred flat into 10 skinnies. Now we have 8 hundreds and 10 tens. If we take one ten away, we have 9 tens left. This is the heart of regrouping!"
- **Modeling Subtraction:** Use the document camera to show 1,000 - 452.
  - "I can't take 2 ones from 0 ones. I look at the tens—zero. I look at the hundreds—zero. I must go all the way to the thousands!"
  - Demonstrate the **"Great Exchange"**: Trade 1,000 for 10 hundreds. Trade 1 hundred for 10 tens. Trade 1 ten for 10 ones.
  - Show the multiplication link: "If I have 10 tens, that's 10 x 10 = 100. If I have 10 hundreds, that's 10 x 100 = 1,000."

2. "We Do": Find the Flaw & Guided Practice (15 Minutes)

- **Find the Flaw:** Display a subtraction problem on the board where the "Zero-Lock" was handled incorrectly (e.g., the student just turned the zeros into nines without regrouping from the thousand).
  - *Task:* Students use their dry-erase boards. "Is this math right or 'wrecked'? If it's wrecked, show me the fix!"
  - Discuss why the "9-9-10" trick works (it's actually 9 hundreds, 9 tens, and 10 ones).
- **Hands-On Mapping:** In pairs, students represent the number 300 using base-ten blocks.
  - "Show me 300 - 40."
  - *Teacher Check:* Are they trading a flat for 10 skinnies? Are they seeing that 300 is 30 tens?
  - *Multiplication Connection:* Ask, "If we have 3 tens, what is 3 x 10? What if we have 30 tens? 30 x 10?"

3. "You Do": The Great Exchange Game (10 Minutes)

- **Collaborative Activity:** Students work in pairs with "The Great Exchange" cards.
  - Card A (Subtraction): "You have 500. Spend 127. Show the trade."
  - Card B (Multiplication): "The shop sells packs of 40 stickers. You buy 6 packs. How many

stickers?" (Encourage 6 x 4 = 24, so 24 tens = 240).
- **Independent Practice:** Students solve three problems on their mat independently: 1. 1,000 - 673 2. 400 - 156 3. 8 x 30 (Using place value reasoning)

III. Conclusion: Closure & Recap (5 Minutes)

- **Summary:** "Today, we learned that zeros are placeholders, but they aren't 'nothing.' We can unlock them by trading from the larger place value next door."
- **Learner Recap:** Ask a student to explain the "Great Exchange" in their own words.
- **Real-World Connection:** "Next time you have a $10 bill and need to buy a $0.50 piece of gum, remember—you're just regrouping that ten into ones!"

Assessment Methods

- **Formative (During Lesson):**
  - "Thumbs-up/Thumbs-down" during the counting routine to check for understanding of regrouping points.
  - Observation of base-ten block placement during the "We Do" phase.
  - Whiteboard "Find the Flaw" check.
- **Summative (End of Lesson):**
  - **The "Mission: Possible" Exit Ticket:** Solve 1,000 - 452.
  - **Written Prompt:** "Explain how you 'unlocked' the zeros to get to the ones place." (Success is 90% computational accuracy and a logical sentence about regrouping).

Differentiation Strategies

- **Scaffolding (Struggling Learners):** Use a color-coded Place Value Mat (Hundreds = Green, Tens = Blue, Ones = Red) to match the base-ten blocks. Provide a "cheat sheet" showing one flat = 10 skinnies.
- **Extension (Advanced Learners):** Challenge them to subtract from 10,000 or to explain the relationship between 1,000 - 452 and 999 - 452 (the "Subraction by Compensation" strategy).
- **Multi-Sensory:** Auditory (counting routine), Kinesthetic (moving blocks), Visual (place value mats).
- **Context Adaptation:** For homeschoolers, use real money (10-dollar bills, 1-dollar bills, and dimes). For a classroom of 22, use partner-pairing to ensure every student has a "math buddy" to talk through the trades.