The Pattern Detectives: Place Value & The Multiplication Connection

Materials Needed

- Large chart paper or a whiteboard
- Dry erase markers in three different colors
- Individual 100-grids or open number line handouts
- "Pattern Spy" magnifying glass (optional/printed)
- Small sticky notes

Learning Objectives

By the end of this lesson, students will be able to:

- Identify and describe horizontal and vertical patterns in a choral counting sequence.
- Explain the function of zero as a placeholder in the tens and hundreds place.
- Translate skip-counting patterns into formal multiplication notation (e.g., 4 groups of 10 equals 40).

1. Introduction: Counting Around the Circle (5 Minutes)

The Hook: "Today, we aren't just counting; we are code-breakers. Numbers have secrets hidden in their patterns, and if we find them, multiplication becomes a superpower."

The Routine: We will 'Count Around the Circle' by 10s. However, to make it rigorous, we aren't starting at zero. We are starting at **4**.

- **Action:** Point to a student to start (4), then the next (14), then the next (24).
- **Challenge Question:** "Before we get to the last person, can anyone predict what the 10th number in our circle will be? How do you know?"
- **Goal:** To notice that while the tens digit grows, the ones digit stays locked in place.

2. Body: Choral Counting & Pattern Mapping (18 Minutes)

I Do: Setting the Stage (5 mins)

I am going to record us counting by 10s, starting back at 0. I will record them in rows of five. (Write 0, 10, 20, 30, 40 on the first line; 50, 60, 70, 80, 90 on the second line; 100, 110... on the third).

Modeling: "Watch my marker. When I hit 100, I see two zeros. One zero is holding the ones place, and one is holding the tens place. This tells me I have exactly 10 sets of 10 and nothing left over."

We Do: Pattern Hunting (7 mins)

Let's look at our grid like detectives. Talk to your neighbor (Think-Pair-Share):

- **Horizontal Pattern:** What happens as we move from left to right? (The numbers increase by 10).
- **Vertical Pattern:** Look at the columns. What is happening as we move down? (The numbers increase by 50 because our rows are 5 wide).
- **The "Zero" Mystery:** "Why does every number in our count end in zero? What would happen to the number 40 if the zero went on vacation and we just wrote '4'?"

You Do: The Multiplication Bridge (6 mins)

Now, let’s turn these "jumps" into math sentences. If we jumped 3 times on our number line by 10s, where would we land? (30).

Activity: On your individual papers, I want you to pick three different "stops" on our count (e.g., 40, 70, 120). Write the multiplication equation for that stop.

- *Example:* "I reached 60. That is 6 jumps of 10. So, 10 x 6 = 60."
- **Rigor Boost:** If we continued this pattern to the 15th jump, what would the number be? Show your work using place value logic.

3. Conclusion: The Power of the Placeholder (7 Minutes)

Recap: "Today we saw that skip counting isn't just a list of numbers—it's multiplication in disguise. We saw that the zero acts as a placeholder to keep our tens and hundreds in the right 'house'."

Success Criteria Check: Students use a sticky note to answer the **"Exit Riddle"**:

> "I am the 12th number in a sequence of 10s (starting at 0). What am I? Write me down and circle the digit that is 'holding the place' for the ones."

Final Reflection: Ask one student to share a pattern they noticed that no one else saw. (Usually, students notice diagonal patterns or digit-sum patterns!).

Adaptability & Differentiation

- **Scaffolding (Struggling Learners):** Provide base-ten blocks (rods) so they can physically place a rod down for every "count" to see the quantity growing.
- **Extension (Advanced Learners):** Ask them to start the count at a decimal (0.5) or a large number (950) and predict when they will cross into the thousands. Ask them to explain how the placeholder zero shifts as they move from 990 to 1,000.
- **Multi-Sensory:** Use a physical "Number Line Walk" where students jump to the counts to feel the distance of 10.

Assessment Methods

- **Formative:** Observation during the "Think-Pair-Share" to see if students are using place value vocabulary (tens, ones, placeholder).
- **Summative:** The "Exit Riddle" sticky note determines if they can apply skip counting to multiplication and identify place value functions.