Example Field Lesson Documentation

Using the 432/532 Lesson Template

LESSON 1: Exploring Motion with Constant Velocity

Grade Level & Topic: 9th Grade Physical Science
Date Taught: Tuesday, February 25, 2026
Standards: NGSS HS-PS2-1 (Motion and Stability)
Learning Objectives: 1. Students will describe the relationship between distance, time, and constant velocity 2. Students will represent motion using position-time graphs 3. Students will use evidence from data to make claims about motion patterns

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PLANNING (What I intended)

Lesson Focus/Goals:
This lesson launches our motion unit using the 5E model. Students will investigate constant velocity motion by collecting real data with motion sensors (Phyphox app), then use that evidence to construct understanding of distance-time relationships before we introduce formal equations.

Materials: - Student smartphones with Phyphox app installed - Measuring tape (8 meters marked on hallway floor) - Stopwatches (backup if needed) - Whiteboards and markers (one per group of 3) - Exit ticket (printed, one per student)

Instructional Sequence (Before-During-After):

Before (10 min): - Show silent video clip: person walking at steady pace, then running at steady pace - Think-Pair-Share: "What's different about these two motions? How would you describe 'steady pace'?" - Surface prior knowledge: speed, distance, time relationship

During (30 min): - **EXPLORE:** Groups of 3 collect motion data using Phyphox - One person walks at constant speed down 8-meter hallway - One person operates phone/app to track position over time - One person records observations - Switch roles; collect 3 trials each (walking, fast walking, running) - **EXPLAIN:** Each group creates position-time graph on whiteboard showing their 3 trials - Class gallery walk to observe patterns - Discussion: What do you notice? What patterns emerge? - I introduce vocabulary: constant velocity, linear relationship, slope = rate of change - **ELABORATE:** Challenge question: "If someone walked at 2 m/s for 15 seconds, how far would they travel? Show your thinking."

After (10 min): - **EVALUATE:** Exit ticket with two questions: 1. Sketch a position-time graph for someone running at constant velocity for 10 seconds 2. What's ONE thing you learned about motion today?

Assessment: - **Formative:** Listen to group discussions during data collection; observe graphs during gallery walk; check for understanding that steeper slope = faster motion - **Summative:** Exit ticket showing ability to sketch linear position-time graph and articulate learning

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IMPLEMENTATION (What actually happened)

What went as planned: - The Phyphox app worked beautifully! Students were engaged and excited to use their phones for science - Groups collected clean data showing linear relationships - Gallery walk was productive—students genuinely looked at each other's graphs and noticed patterns - Students correctly identified that steeper lines meant faster motion

What changed in the moment: - The hallway was too crowded during class transition (2nd period), so I moved the activity to gym - One group's phone died—I let them use my phone as backup - The "elaborate" challenge question was too easy for most students—they finished in 90 seconds. I added follow-up: "What if they walked BACKWARD at 2 m/s? How would the graph look different?" - Ran out of time for full exit ticket—gave them 3 minutes instead of 5. Some students rushed.

Student engagement: - High! Students were physically active, collaborative, and curious - One student asked unprompted: "Does this work for cars too?" (Great connection—I told him we'd explore that next class) - A few students struggled to keep "constant" velocity—their graphs had curves. I used this as a teaching moment during gallery walk to contrast constant vs. changing motion

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ASSESSMENT (What students did)

Formative assessment: During the gallery walk, I asked groups: "What does the slope of the line tell you?" Most groups (7 out of 9) correctly said it showed how fast the person was moving. Two groups needed prompting—they said "it shows time" (confusing the x-axis with the slope itself). I clarified on the spot.

Data collected: - **Phyphox graphs:** All groups exported their data (I have 9 graph screenshots saved) - **Whiteboard graphs:** Photographed all 9 (see attached images—filed by group number) - **Exit tickets:** 27 students completed them (see scanned PDF)

What the artifacts show: - **Exit Ticket Q1 (position-time graph):** 22/27 students drew LINEAR graphs with positive slope. 3 students drew curved lines (still thinking "motion = curve"?). 2 students left blank (ran out of time). -

Exit Ticket Q2 (what I learned): Most common responses: - "Faster motion = steeper graph" (11 students) - "You can graph motion with time and distance" (8 students) - "Constant velocity makes a straight line" (5 students) - 3 students gave vague answers ("I learned about motion")

REFLECTION (How it went)

What surprised me: I was surprised how quickly students grasped the slope = speed relationship! I thought I'd need to explicitly teach this, but they discovered it themselves during the gallery walk. The hands-on data collection made it intuitive.

What would I do differently next time: 1. **Timing:** I underestimated how long data collection would take (groups wanted multiple trials to "get it right"). Next time I'd budget 35-40 minutes for the During phase, not 30. 2. **Challenge question:** I need a better "elaborate" task that pushes thinking further. Maybe: "Design a motion pattern that would create a position-time graph shaped like stairs." 3. **Exit ticket:** Give them the full 5 minutes—or make it homework if time runs short. Rushed responses don't show their real thinking.

What's one question you have about this lesson or your teaching? How do I handle the students who finish early without making them feel like they're being punished with "extra work"? The fast finishers seemed bored during the last 10 minutes while slower groups caught up. I need better strategies for differentiation.

Photos of Student Work: (not included in this example, but you would attach graph screenshots and exit ticket scans)