**SCIENCE EXPLORE LESSON PLAN**

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| **Lesson Plan Background** |
| **Teacher: WACKERMAN** | **Date: 1/27-28** |
| **Course:** PHYSICS | **Unit Title: MOMENTUM** |
| **Objective** |
| **Skills/Content:** *By the end of today’s lesson, what will students know and be able to do?* SWBAT… Use the law of conservation of momentum to calculate momentum of objects in collisions | **Assessment:** *How will students demonstrate mastery of the objective?* By… Exit slip assessing one problem and asking for a critical thinking response to another | **Criteria for Success:** *What are the features of an ideal product?* That includes… Correct setup of work and formulaCorrect application of formulaCorrect answer and units |
| **Other Lesson Plan Considerations** |
| **Key Conceptual Understandings:** *What key ideas do students need to take away from today’s lesson?* Conservation of Momentum states that the total momentum of a system before a collision is equal to the total momentum of the system after the collisionƩpinitial=ƩPfinal |

| **Lesson Plan Components** |
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| **Time** | **Component** | **Detailed Explanation of Components*****(What is the teacher doing? What are the students doing?)*** |
|  | **Planning** | **Planning Part I: Scripting the Key Understanding** |
| Conservation of Momentum states that the total momentum of a system before a collision is equal to the total momentum of the system after the collisionƩpinitial=ƩPfinal |
| **Planning Part II: The Activity** |
| **Activity:**In small groups, students investigate 4 scenarios involving collisions to determine a relationship around total momentum**Data gathered and analyzed:*****Directions:*** *On the following two pages, you will find 3 additional scenarios. A description of each is detailed below. With your group members, divide up the work and calculate the before and after momentums in each scenario, in order to prove or revise your hypothesis***Example Scenario:** A heavy cart traveling to the right collides with a light cart traveling to the left and the two bounce apart.**Scenario 1:** A moving heavy cart collides with a stationary light cart, and the two bounce apart.**Scenario 2:** Two carts of equal mass are traveling the same direction. The faster cart collides with the slower cart and they stick together**Scenario 3:** A heavy cart traveling slow to the right collides with a light cart traveling fast to the left and the two stick together. |
|  | **1****Frame****(5-7 min.)** | **Focus:**Prove or disprove the hypothesis that momentum before a collision equals momentum after a collision**Academic and behavioral expectations:**Working quietly with group members in seat pods or pairsNormal classroom expectations apply |
|  | **2****Data Gathering and Analysis****(10-20 min.)** | **Independent Work Time:** |
| **Monitor and gather data for:**Correct work shown on paperCorrect answerCorrect conclusion verifying hypothesis**Intervene if 50+% of the class shows:**Not successfully using steps to answer questions, or arriving at wrong answers |
|  | **3****Whole Class Discussion****(10 min.)** | **Everybody writes:**Cite conceptual and numerical evidence from the 4 collisions we have investigated in order to confirm or reject your hypothesis (you are given many lines to write on purpose)**Show Call:**Exemplar student answerInstruct students to write numerical evidence of before after from 2+ scenarios**Drive toward the stamp:**CC can someone restate our hypothesis?Tell your neighbor if, based on the evidence from the lab, it is confirmed or denied.Share out. |
|  | **4****Stamp the Key Under-standing****(5 min.)** | **Name the rule:**Conservation of Momentum states that the total momentum of a system before a collision is equal to the total momentum of the system after the collisionƩpinitial=ƩPfinal |
|  | **5****Apply Key Under-****Standing****(10 min.)** | **Exemplar Response** |
| *Annotate key aspects of the exemplar by circling essential words, phrases, or problem steps for quick monitoring.***Unfinished** |
| **Actionable Feedback Key** |
| *Insert Codes for Actionable Feedback that you will write on student papers. Plan to write these on student papers & briefly explain the error that needs to be fixed.* |
| **Classroom Data** |
| *Circulate from High to Medium to Low Students. Use tally marks or student initials to record who has/ has not mastered.* |
| ***Mastered*** | ***Not Mastered*** | ***Common Errors*** |
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| **Response to Data:** *Plan how to react if…* |
| **Most have it right (<70%)** | **Around half have it right (50-70%)** | **Most don’t have it right (<50%)** |
|  | *Note common misconceptions, errors, or struggles to adjust your planning for the following lesson.* |
| **Student Support Planning** |
| **Students to Guide First** | **Prompts/Questions** |
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