Project Title Inquiry-Based Physics

Project Description
The goal of this project is to equip our physics classroom with a set of pre-packaged investigations that provide students with hands-on experiences in exploring fundamental physics principles. By funding these specific lab kits, students will be able to actively engage in experiments related to motion, forces, energy, waves, and electricity. This set of 16 investigations will enable students to observe, measure, and analyze real-world phenomena, bridging the gap between theoretical physics concepts and their practical applications.

Project Objectives and Goals
Objective 1: Enhance students' understanding of physics concepts through interactive, hands-on laboratory investigations.

Objective 2: Provide structured, engaging activities that promote scientific inquiry, data collection, and critical analysis skills.

Objective 3: Foster enthusiasm for STEM fields by enabling students to actively participate in physics experiments that demonstrate real-world principles.

Goal: Improve student engagement and comprehension in physics, as measured by increased performance on lab reports, unit tests, and overall course assessments.

Number of Students/Grade Levels Impacted
60+ 9th grade physics students

Project Methods and/or Activities
The project will use a sequence of 16 investigations that align with the physics curriculum. Each investigation focuses on a specific concept, allowing students to build their understanding progressively throughout the year. These investigations include:

Measuring g: Exploring Free-Fall – Observing and calculating gravitational acceleration.
Graphing Motion – Learning to interpret and construct motion graphs.
Newton’s Second Law – Investigating the relationship between force, mass, and acceleration.
Coefficient of Friction – Measuring the coefficient of friction between various surfaces.
Uniform Circular Motion – Studying the forces and motion in circular paths.
Conservation of Energy on an Inclined Plane – Exploring energy conservation principles.
Conservation of Elastic Potential Energy – Investigating the energy in elastic materials.
Conservation of Linear Momentum – Examining momentum conservation in collisions.
Hooke’s Law and Simple Harmonic Motion – Measuring forces and motion in elastic materials.
Simple Pendulums – Calculating gravitational forces and energy transfer with pendulums.
Rotational Motion and Angular Momentum – Observing rotational dynamics.
Torque – Exploring the relationship between force and rotational motion.
Mechanical Waves – Demonstrating wave properties and behavior.

Speed of Sound – Measuring sound speed in different mediums.
Electrical Circuits – Building and analyzing simple electrical circuits.
Resistance and Resistivity – Investigating factors that affect electrical resistance.

Project Budget Request
$1000.00

Itemized Budget
Physics Lab Kits - Flinn Scientific: $900 (+shipping +tax)

Project Evaluation - How will you assess and evaluate the outcomes generated by this grant (e.g., pre/post-test scores, questionnaires)? Include any relevant evaluation forms.
The project's impact will be measured through:

Student Assessments: Pre- and post-lab assessments to evaluate gains in content knowledge and understanding.

Lab Reports: Analysis of students' lab reports, which will be evaluated for accuracy, depth of understanding, and analytical thinking.

Student Surveys: Surveys will gather feedback on engagement, enjoyment, and perceived learning from the hands-on lab activities.

Teacher Observations: Informal observations of student engagement and collaboration during lab activities.

Project Timeline - Include a schedule showing start date, milestone dates, and end date.
December – January: Purchase lab kits and organize materials.

February – May: Conduct investigations sequentially, with one lab activity per concept.

February: Free Fall, Graphing Motion, and Newton's Second Law

March: Coefficient of Friction, Uniform Circular Motion, and Conservation of Energy

April: Hooke's Law, Pendulums, Angular Momentum, and Torque

May: Waves, Speed of Sound, Circuits, and Resistivity

June: Analyze student assessments and surveys to evaluate project impact and compile results into a final report.