PROJECT RADAR

A SAFE ROUTES TO SCHOOL
EAST CENTRAL WISCONSIN PARTNERSHIP

Project RADAR: Physics Lesson Plan

This physics lesson plan is an opportunity for students to take the tools they are learning in current Physics classes and apply it to a fun, interactive lesson plan of monitoring speeds of cars in busy intersections around their High School.

Physics elements:

- Velocity Measurements
- Graph Analysis
- Critical thinking

Instructions for lesson plan recommendations to help make this a successful event:

- 15-18 students to be broken up into 3 teams (student team =5-6 students)
- Planning involvement of math or physics teachers
- Target students who can apply _____? (Sophomores, Juniors & Seniors may be best fit)
- **Observation**: Most cars passing school don't appear to accelerate.
- The project will need a minimum of **3 class dates** set for those involved & student teams, each to be 30 min-45 min each:
    - 1) **1st Class Date:** Pre-event presentation/overview of project to set-up event
    - 2) **2nd Class Date:** Event with radar velocity radar guns (student teams with supervisor)
    - 3) **3rd Class Date:** Post-event wrap-up & debrief, career based questions & awareness to community and school on findings.

Materials needed:

- Project RADAR kit
- Lesson Plan sheet (1 per student team, 20 vehicles recording per sheet)
- Parent/Guardian permission letter
- Project RADAR PowerPoint (on flash drive) for school staff/project coordinator to present for pre-event & post-event activities

Speed Record Sheet (1 sheet per student team)

Group A

TIME	VELOCITY

Group B

TIME	VELOCITY

Group C

TIME	VELOCITY

Group D

TIME	VELOCITY

Group E

TIME	VELOCITY

Project RADAR: Physics Debrief (1 sheet per student team)

Question: How does the acceleration of a vehicle change as it passes school?

Hypothesis:

Independent Variable: Time
Dependent Variable: Velocity
Control(s): Distance

Materials: 3 Radar guns, 2 stopwatches, distance-measuring wheel, flag

Procedure:

1. Set up three stations with radar guns exactly 300 feet apart. One person should operate the gun, another should act as the timer, and a third should act as the recorder.
2. As a car approaches, the person at station 1 should measure its speed with the radar gun. The recorder should signal stations 2 and 3 to start their timers when the car reaches station 1. Record data.
3. When the car reaches station 2, measure the speed with the radar gun. Stop the timer as the car reaches station 2. Record data.
4. When the car reaches station 3, measure the speed with the radar gun. Stop the timer as the car reaches station 3. Record data.
5. Calculate the acceleration of the vehicle between points 1 and 2, between points 2 and 3, and between points 1 and 3.

Data:

Vehicle Speeds:

Station	Time (s)	Time Difference (s)	Velocity (mi/h)
1	0	XXXXXXXXXXXXXXX	
2		XXXXXXXXXXXXXXX	
3			

Vehicle Acceleration:

Between Stations	v_f (mi/h)	v_i (mi/h)	t (s)	Formula $a=(v_f - v_i)/t$	Substitution	Acceleration (mi/h/s)
1-2						
2-3						
1-3						

Graph:
Graph velocity vs. time for your car and the other three provided.

Explanation:
1. Is there a change in acceleration for each car? What happens? Describe the acceleration of each car.
2. How do the accelerations of each car compare? Why do you think this is?
3. Do you accept or reject your hypothesis? Why?
4. How does your calculated accelerations relate to the graph? What do these numbers represent?