

GRAPH YOUR ROUTE!

In this lab you will graph the motion of a carload of physics students out for a drive. To complete the lab you will need four people, notebook and pencil, and a watch with second hand or stopwatch capability. Remember to follow the graduated licensing law!

NOTE: **Think metric** [1.6 x miles = kilometers (km)].

Instructions:

1. Plan a route in/around town (not on freeway) at least **2 kilometers** long. Choose streets that are not too busy; avoid heavy traffic. Begin at rest ($v_i = 0$). Include at least **two turns** and **two stops** (stop signs, other than start and stop). Prepare a **map** of the route including street names, distances of each segment, stops, and a brief narrative that explains what happened as you completed the trip.
2. Be sure you have parent/guardian **permission** to use the car to complete the lab.
3. **Obey** all traffic laws and safety regulations. Drive safely and wear safety belts.
4. **4 people** are required: driver, timer, data recorder, and speedometer/odometer observer.
5. Drive the route at least once for **practice** prior to taking data.
6. Record in a **data table** the elapsed trip time (sec), odometer reading in tenths (km), and speedometer reading v (km/hr) every 15 seconds. Convert all units to metric where required (show conversions).
7. Prepare **two graphs** using a computer program (Excel, GA), each on a separate page:
 - * Accumulated distance s (km) vs. elapsed time t (sec). Begin at zero distance and time.
 - * Instantaneous velocity v (km/hr) vs. elapsed time t (sec).
 On each graph write an **explanation** of what the graph shows. Point out areas of acceleration and deceleration directly on graph. Be sure to properly label axes and properly connect data points.
 On the distance-time graph, show calculation of the car's **average velocity** (km/hr) for the trip.
 NOTE: Science computers can be used for graphing, but class time will not be provided

8. Prepare and submit **one full lab report** per group, typed (worth 40 points). Include in following order:
 - _____ (4 pts) Cover page with names of all 4 students/teacher(s)/class hour(s)
 - _____ (2 pts) Purpose
 - _____ (2 pts) Procedure; can be this handout
 - _____ (5 pts) Map with street names, distances (km), stops, and trip narrative
 - _____ (4 pts) Original and smooth data tables with proper headings/units
 - _____ (10 pts) Two graphs (5 pts each) with proper units and labels; hand or computer generated
 - _____ (4 pts) Graph explanations (2 pts each) written at bottom of graph
 - _____ (2 pts) Average velocity calculation (km/hr) on distance-time graph
 - _____ (2 pts) Group Conclusion ("we")
 - _____ (1 pt) Group Summary ("we")
 - _____ (4 pts) Neatness/accuracy/units/following instructions and safety procedures

DUE DATE: September ²⁴~~25~~; can be turned into any physics teacher, any hour.