

# Position, Velocity, and Acceleration Graph Relationships

Grade Level: 12 3 class  
Duration: periods

Subject: Calculus

Prepared By: Brad Hunt

## Materials Needed

| Gps data Recorders, Graphing Calculators, Travel Recorder Software   |  |   |   |
|--|--|---|---|
| <b>Analyze Learners Overview &amp; Purpose (STEMcinnati theme)</b><br>Overview:<br>A: It is important for students to be able to connect graphs of position, velocity, and acceleration.(Differentiation, Integration)<br>C: Engineers use Differentiation and Integration to solve problems that occur in their designs.<br>S: Traffic Engineers make decisions that directly impact our daily lives. |  | <b>Education Standards Addressed</b> <ul style="list-style-type: none"> <li>Students will be able to graph a function from the graph of its derivative.</li> <li>Students will be able to graph a derivative from the graph of its function.</li> <li>Students will be able to graph the derivative of a function given numerically with data.</li> <li>Students will be able to interpret the area under the graph as a net accumulation of a rate of change.</li> </ul> |   |
| <b>Activity</b><br>Introduction to Traffic Engineering<br><br>Field Trip To ARMIS<br><br>Analyze GPS Data<br><br>Graphing Activity<br><br>Group Graphing Activity  | <b>Teacher</b><br>Power point – Traffic Reliability<br>- RET project<br><br>Data will be downloaded into the Travel Recorder software and converted into Excel<br><br>Students will develop a velocity vs time graph from a trip on SR 562 to Kenwood Rd.<br><br>Graph acceleration vs time from their velocity graph<br><br>Provide students with various graphs (In an Excel file) | <b>Students</b><br>Students will develop a knowledge of velocity, acceleration and Position<br><br>Using a GPS Data Logger students will collect data on the bus to ARTIMIS<br><br>Students will be able to identify constant velocity, acceleration, and deceleration from those graphs<br><br>Same as teacher<br><br>Groups will derive acceleration and position graphs from provided velocity graphs  | Students will write a newspaper article about the trip to ARTIMIS<br><br>Student graphs will be evaluated based on a rubric to be developed<br><br>Groups critique other groups solutions based on the above rubric |
| <b>Utilize Technology</b>  | Microsoft Excel, Graphing calculators  |   | <b>Other Resources</b><br>(e.g. Web, books, etc.)   |