

Introduction to Kinematics and Video Analysis

Kinematics is the science of describing the motion of objects using words, diagrams, graphs, and equations. Kinematics (motion in one direction) does not deal with why things move, just how things move.

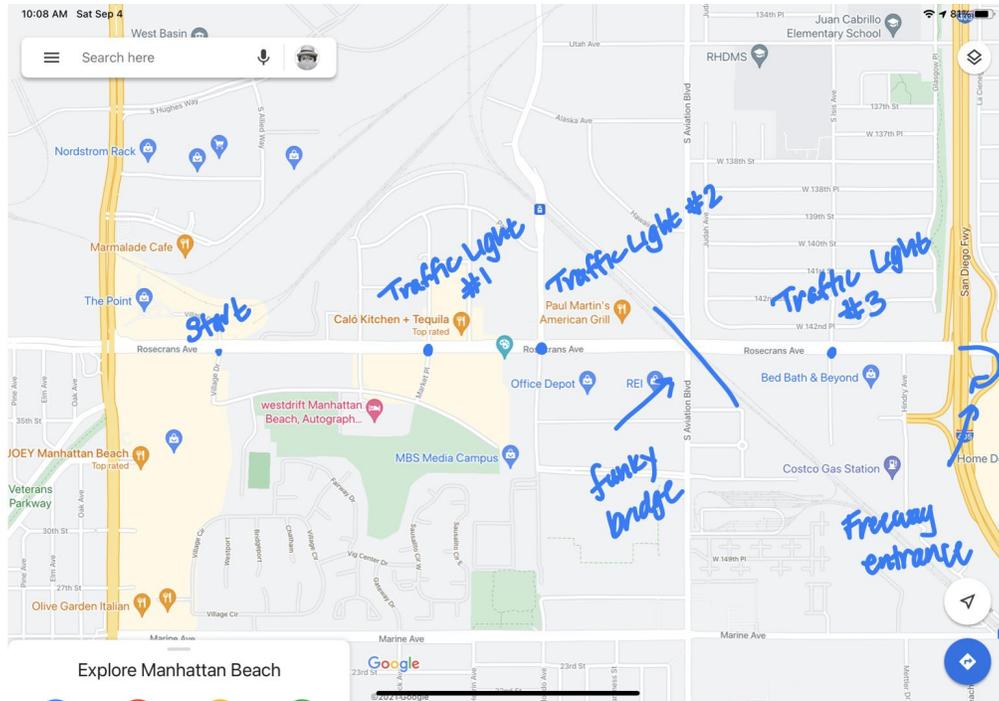
You could certainly learn physics if you were given a set of equations and asked to apply them to specific problems. You will approach physics by thinking about specific scenarios (that's concepts), by collecting and analyzing data (that's graphs) and then using that information to construct relationships (that's equations).

Reminders

1. Make a copy of this document and name it: 21HPhysLastNameKVA. Then share the document with me.
2. Don't forget to include your name on this document.
3. This assignment will only be checked, not graded.
4. The overall goal of this assignment is for me to see how you think through problems and scenarios.
- 4. For this assignment, you may not use any outside resources such as textbooks, websites or apps.**

Part 1: Asking Questions

1. Watch the [video](#) of Mr. Walters and my younger cousin Will as we drove along Rosencrans Avenue in Manhattan Beach. A map of the route is shown below.



2. You will post to the following Jamboard, Note: You may post individually. You do not need to post as a group, nor do you need to review/discuss your questions.

3. On the Jamboard, post any and all questions you have about the video. Your questions may be:

A. **Physics related:** How far did we travel or what is the velocity of our car relative to the velocity of the cars next to us?

B. **General in nature:** what is that funky bridge for or what's the deal with the red light on the freeway entrance ramp?

Part 2: Analyzing Data

1. The length of our trip was 4 minutes and 24 seconds (or 264 seconds).

2. On a white, unlined piece of paper, sketch a graph of velocity vs. time. Use the whole paper. No scrunchy graphs. No computer generated graphs.

3. Remember to label your axes (variable and unit) and to give your graph a title.

4. Your graph should show "relative velocities." A segment in which we are driving faster should be higher on the graph than a segment in which we are driving slower. There are a lot of context clues in the video for you to determine our general velocity.

5. Take a photo of your graph and insert it below. Please make sure your photo is clear.

Part 2: Analysis Questions

1. For your graph, identify the independent and dependent variables.
2. Without doing any independent research, identify one time segment during which we are “speeding up” (positive acceleration) and one time segment during which we are “slowing down” (negative acceleration).
3. How would you use your graph to determine positive acceleration and negative acceleration?
4. BONUS: Sketch a graph of position vs. time. Think very carefully about the shape of your graph.