

Kinematics Graphs – Video Analysis

Phys 141 → slowing down in positive direction Video: SloAway

Phys 151 → slowing down in positive direction Video: SloAway and
 speeding up in negative direction Video: SpeedTo

For each motion under investigation perform the following tasks.

Instructor

- defines positive and negative directions
- demonstrates the motion with a fan cart on a level track
- take data of x and t from the movie for the whole class (these movies are on the desktops and students can view them independently.)

Students

- hand plot x vs t (see instruction below)
- use the graph to find velocity at one instant
- plot x vs t using logger pro
- curve fit data, then print graph
- interpolate data, then use the “slope feature” to get five data points for velocity
- hand plot v vs t
- from the graph of v vs t determine the acceleration
- Draw a motion diagram (see instruction below)

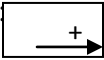
In the conclusion of the report include the numerical results and a description of the shape of each graph. Use terms like “parabola opening up or down” or “straight line with positive or negative slope”.

Plotting Graphs By Hand

- Pick a scale so the graph takes up most of the page.
- Label the axes and indicate units in parentheses.
- Put the data points on the graph, then draw a smooth curve or line through the data points.
- When calculating slope, do not use the data points. Pick two points on the line and mark them on the graph. Carry units when you record the coordinates of a point from the graph.

Motion Diagram

A motion diagram consists of three parts.

1. An arrow with a positive sign on top of it drawn inside a rectangle to show the positive direction. Ex: 
2. A series of arrows representing velocities as time goes by. Ex: $\longrightarrow \longrightarrow \longrightarrow$
3. Another arrow drawn above or below the velocity vectors to show the direction of acceleration, and labeled with “a” for “acceleration. Ex: \xrightarrow{a}

Here is the complete motion diagram for an object moving in the positive direction as speeding up:

