

01-09

Linear Motion
Vectors & Scalars

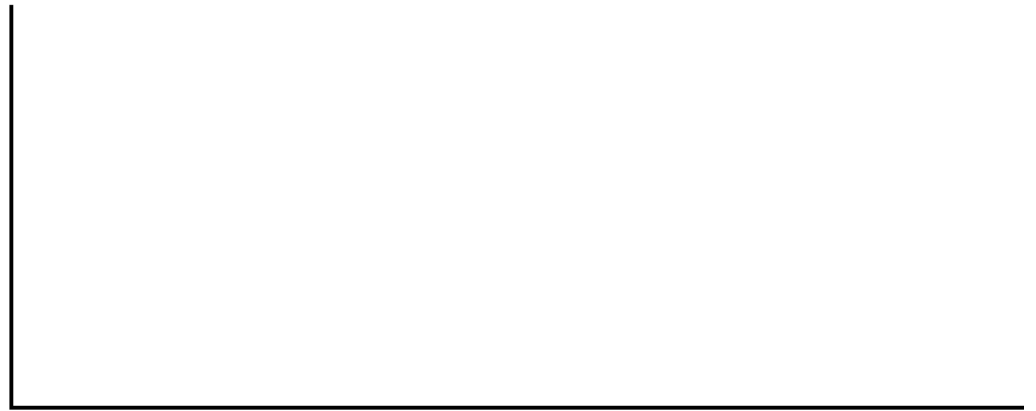
Graphs

- Formal graphs should include:
 - Title
 - Labels (both X and Y)
 - Appropriate spacing use up most of space available and be linear

Label (for dependent variable)

Title

Label (for independent variable)



By the way....

- We are used to maps, a world with gravity and Cartesian coordinates, so:
 - Forward, up, east or right are considered positive directions
 - Backward, down, west or left are considered negative directions

Three things YOU read from a graph

- A direct value (what you've always done)
- A slope (a rate of change: Y/X)
- Area under line (Y times X)

Three kinds of graphs

Seven pieces of information

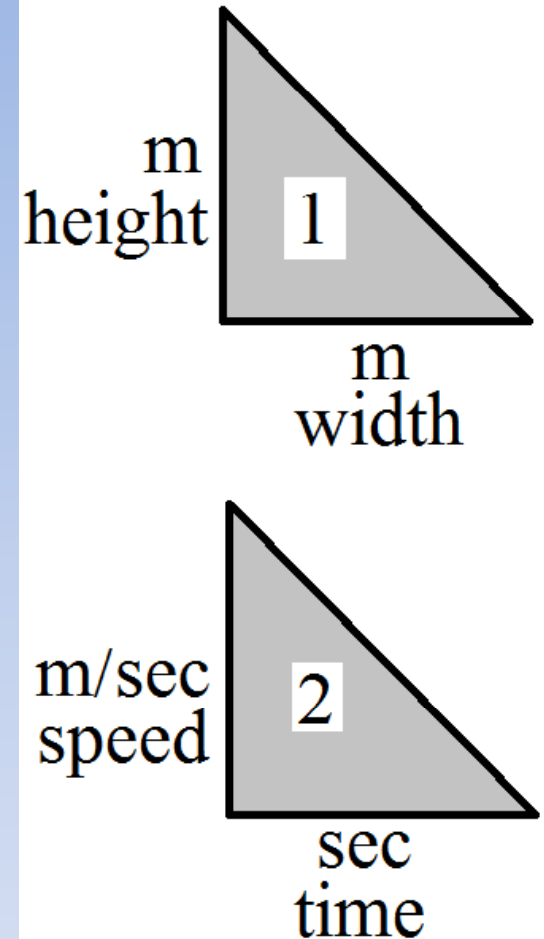
- X vs. t
 - Read directly; slope = velocity
- V vs. t
 - Read directly; slope = acceleration; area = change in position (displacement)
- a vs. t
 - Read directly; area = change in velocity

Average vs. instantaneous values

- Averages happen over a PERIOD of time
 - Examples:
 - What was your average test grade for the first three months?
 - What was your average speed for the first hour of your tripe?
 - How far did you travel between 2:00 PM and 3:00 PM on Monday?
- Instantaneous values are points in time, not periods in time
 - Examples:
 - How fast were you going at 2:30 PM
 - How far from home were you on Monday?
- We've talked about a lot, lets see what you know....

Clicker Question

- What would the UNITS for AREA of each triangle? (units for 1st triangle, units for 2nd triangle)
 - a) m/sec, m
 - b) m²,m
 - c) m²,m/sec²
 - d) None (dimensionless), m
 - e) None of these is correct



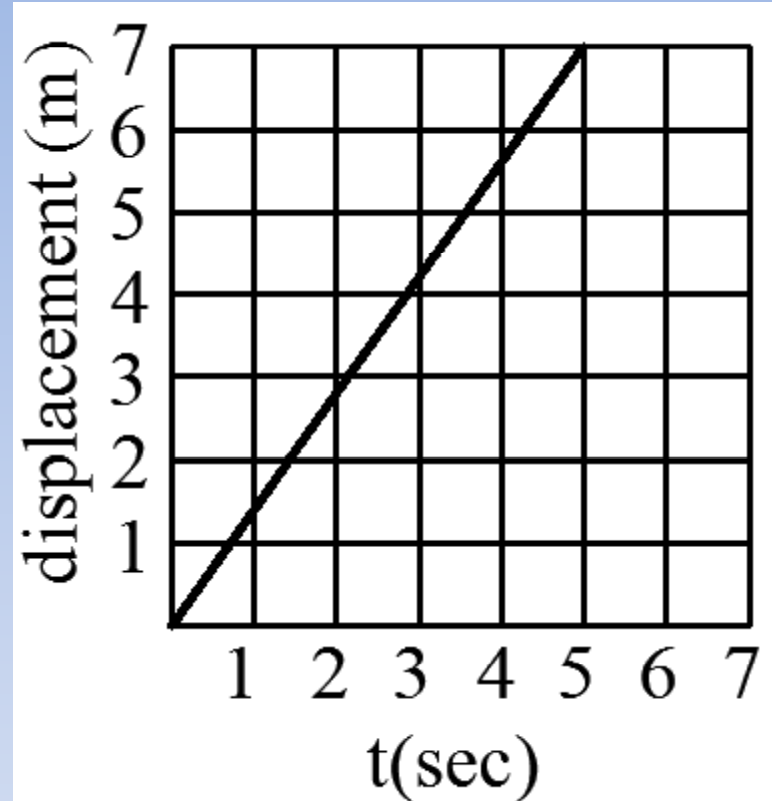
Sample graphical interpretation 1

(we'll draw this together)

1. Danica enters the freeway going 30 mph (1/2 mile per minute) and speeds up to 60 mph over a 1 minute time period. She cruised at this speed for 5 minutes, then brakes back down to 30 (braking slowly over 1 minute) because of bad traffic.
 - Plot V versus t (easy)
 - Say how fast was she going every even minute (easy, *hint: how do you find m/s in a m vs. s graph?*)
 - Find how far she went and her rate of acceleration (harder, *hint: how do you find m/s^2 in a m vs. s graph?*)

Clicker question – *do you know what displacement is?*

- The graph shown is a straight line for a man's motion. Which statement is true?
 - a) He is accelerating
 - b) He is not accelerating
 - c) You cannot tell if he is accelerating
 - d) He is going backward
 - e) Two of these statements MAY be true



Clicker question – do you know what distance is?

- The graph shown is a straight line for a man's motion. Which statement(s) below is/are true?
 - a) He is moving forward
 - b) He is moving backward
 - c) He cannot be moving in a circle
 - d) He may be motionless
 - e) Two of these statements MAY be true

