D 1 **Aim: Kinematics Concepts (Intro)** 9/8/27

- Study of motion of an object

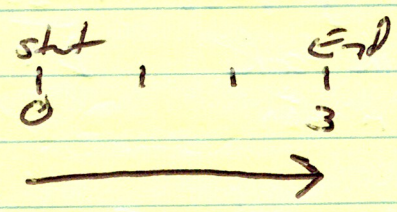
Need to know

① Where it is: Position / Displacement / Distance

② How fast it is moving / Dir: Speed / velocity

③ Change speed / Direction: Accel.

1-D Motion (Move Right/Left)



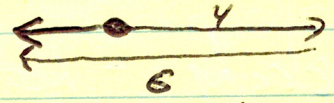
Position: is a pt in space

Can be a vector from Origin

(Δx) Displacement: Vector from initial position to final position

$\Delta x = x_f - x_i$

Ex. Start @ Origin, Go 4m Right, turn & go 6m left

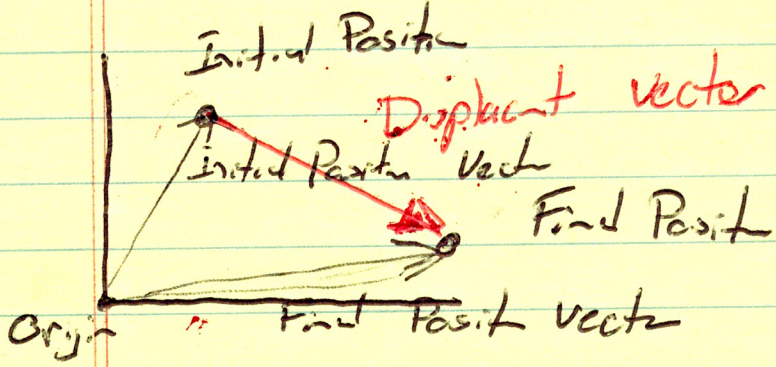


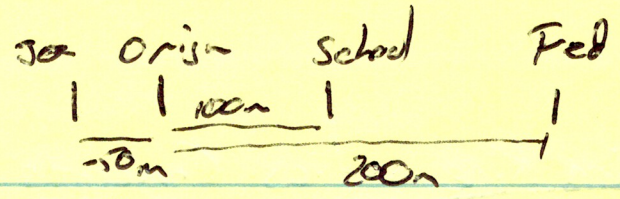
Ans. 2m left (Nothing about path taken)

Distance: Length of the path traveled: 10m

(Talks about the path taken)

2-D Motion





Example 6min 17 sec.

a) School → Fred → Joe

Dist. = 100m + 250 = 350m
S → F F → J

Displacement - Vector - Need +/-
Only initial Final
School Joe

* Distance is always pos.

b) Avg Speed $\bar{v} = \frac{\Delta dist}{\Delta t} = \frac{350m}{10\,min} = 35\,m/min$

If walk took 10 minutes

Avg Vel. $\bar{v} = \frac{\Delta displ}{\Delta t} = \frac{-150m}{10\,min} = -15\,m/min$

c) Instantaneous Speed/Velocity - Not Avg We don't know what is happening

Instantaneous Vel. = Instantaneous Speed + Dir