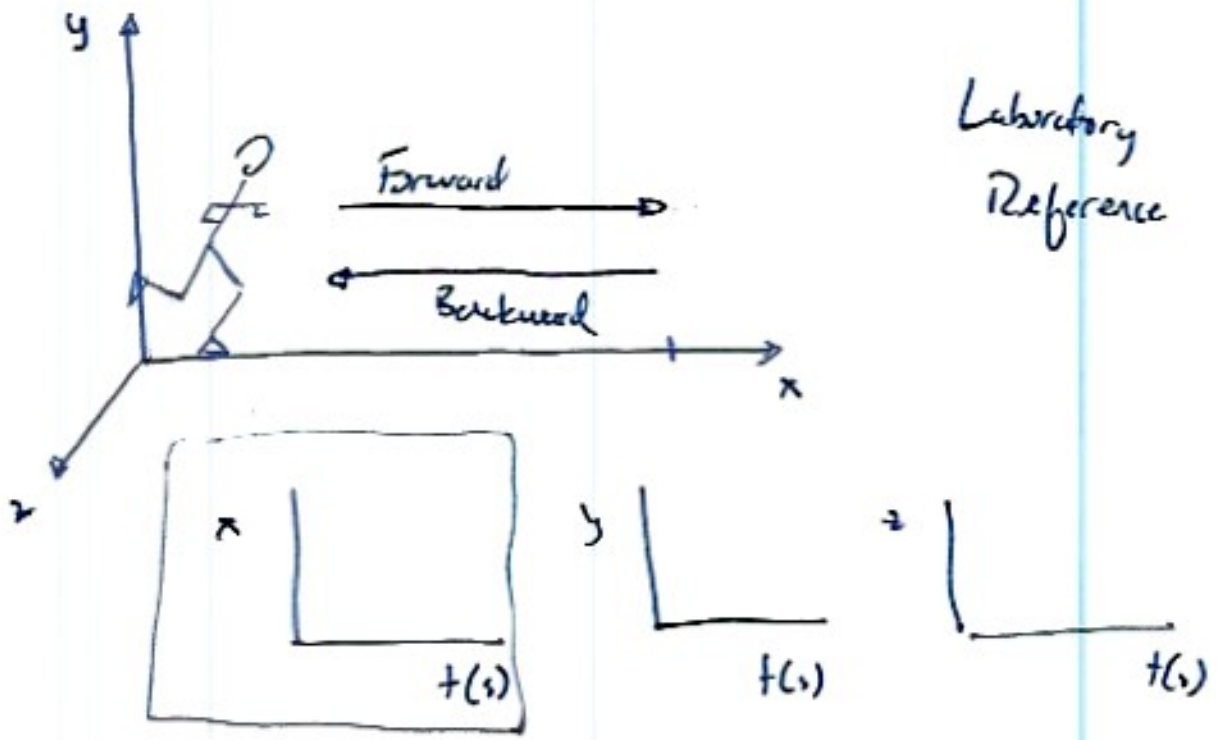
Kinematic Analysis : Shuttle Run



PVA

Position : Distance : total change in position (units : length) scalar

Displacement : Straight line distance between two points

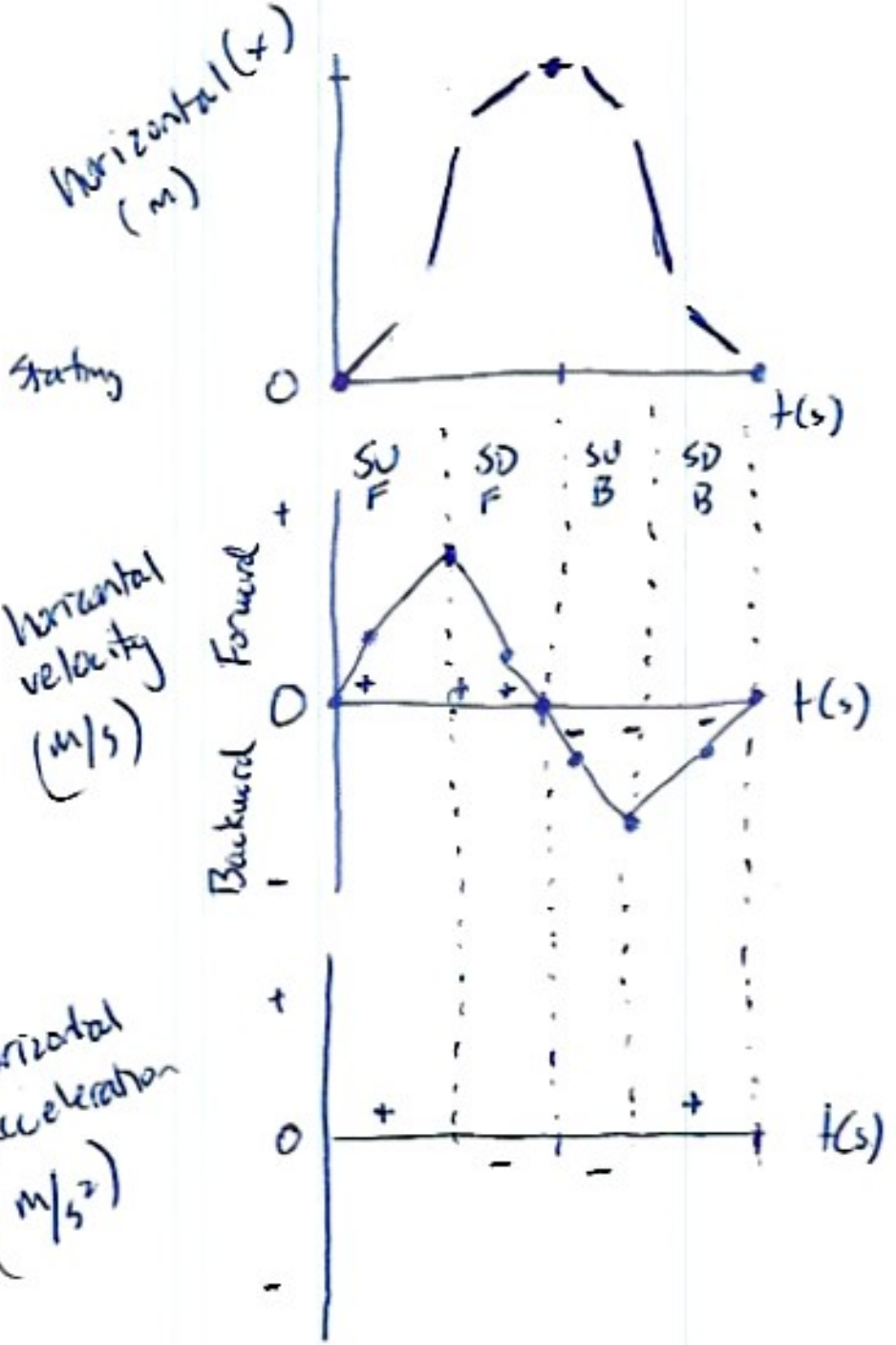
$\Delta s = s_f - s_i$ units : length vector

Velocity : $v = \frac{\Delta s}{\Delta t} = \frac{s_f - s_i}{t_f - t_i}$ units : $\frac{\text{length}}{\text{time}}$ e.g. m/s vector

speed $= \frac{\text{distance}}{\text{time}}$ units $= \frac{\text{length}}{\text{time}}$ scalar

Acceleration : $a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i}$ units : $\frac{\text{velocity units}}{\text{time}}$ eg. $m/s/s$ m/s^2

Direction of the acceleration vector does not indicate direction of motion. Vector



$$\text{Slope} = \frac{\Delta y}{\Delta x} = \frac{\Delta x}{\Delta t} = v_x$$

$$v = \frac{x_f - x_i}{t_f - t_i}$$

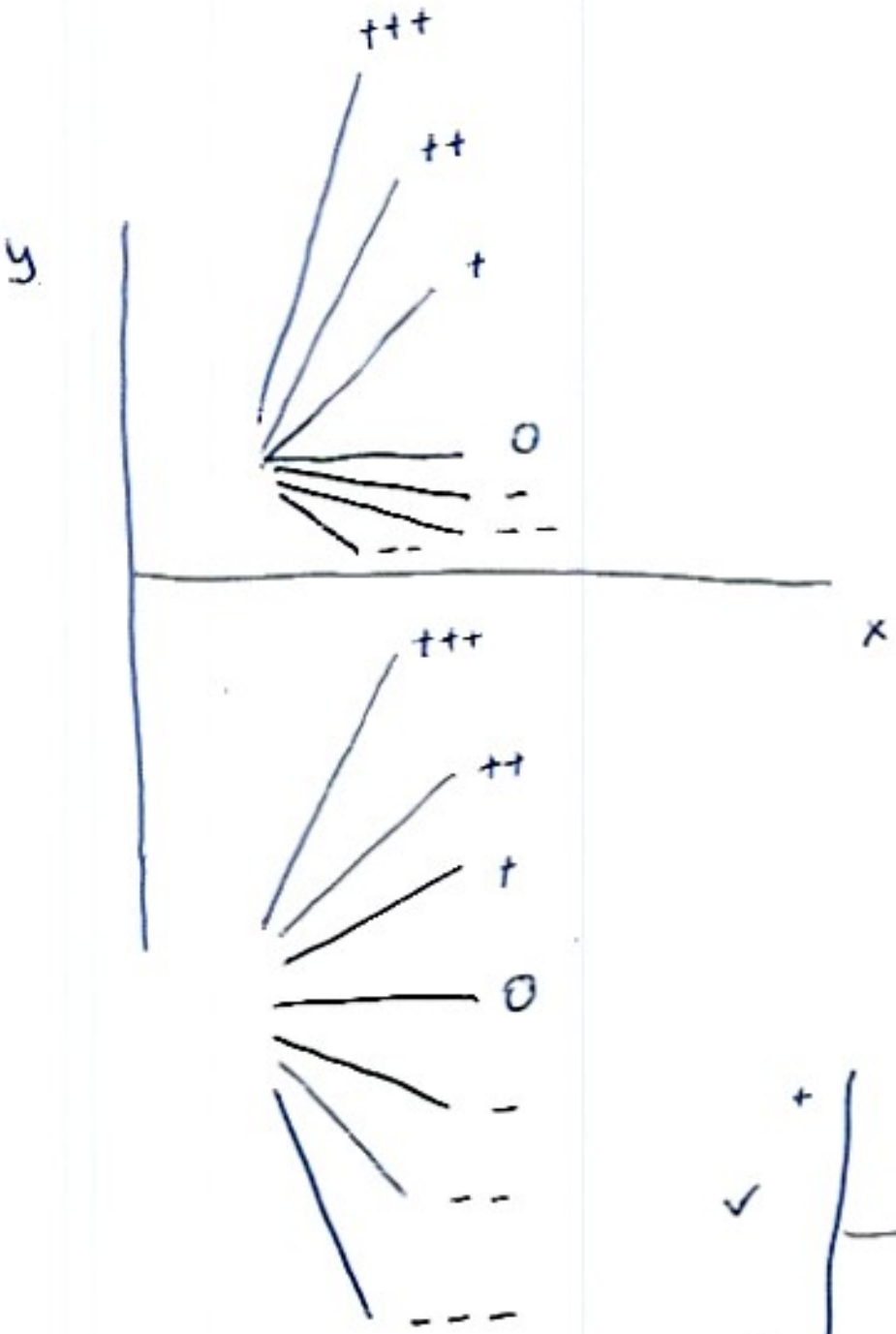
$$\text{Slope} = \frac{\Delta v}{\Delta t} = a$$

$$a = \frac{v_f - v_i}{t_f - t_i}$$

Slope of the position vs. time plot tells us everything we need to know about v. [magnitude direction]

Slope of the velocity vs. time plot tells us everything we need to know about a.

The direction of the acceleration vector does not tell us direction of motion. $\Sigma F = ma$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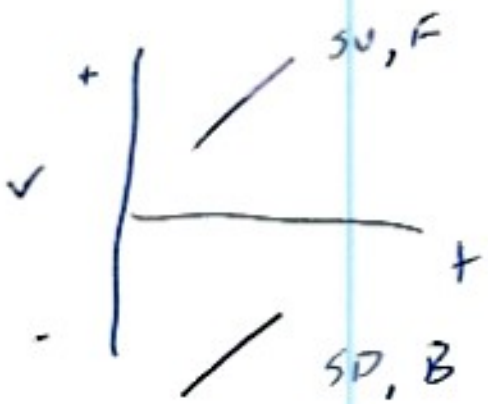
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