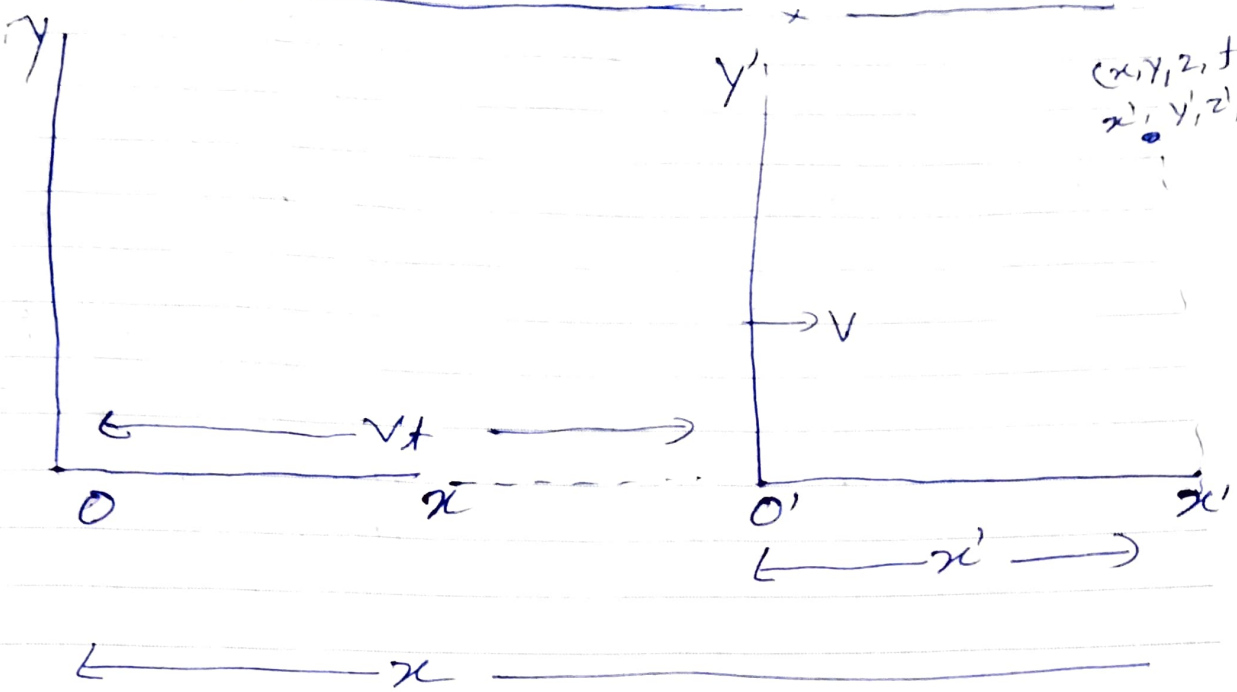
10/4/21

VELOCITY TRANSFORMATION EQUATION



$$x = Vt + x'$$

$$x' = x - Vt$$

$$y' = y$$

$$z' = z$$

$$t' = t$$

$$x = x' + Vt'$$

$$y = y'$$

$$z = z'$$

$$t = t'$$

Galilean transformation equation

$$v_x = \frac{dx}{dt} \qquad v_x' = \frac{dx'}{dt'}$$

$$v_y = \frac{dy}{dt} \qquad v_y' = \frac{dy'}{dt'}$$

$$v_z = \frac{dz}{dt} \qquad v_z' = \frac{dz'}{dt'}$$

$$v_x' = \frac{dx'}{dt'} = \frac{d}{dt'}(x - vt) = \frac{d}{dt}(x - vt)$$

$$\frac{dx}{dt} - \frac{v\,dt}{dt} = v_x -$$

$$v_y' = \frac{dy'}{dt'} = \frac{dy}{dt} = v_y$$

$$v_z' = \frac{dz'}{dt'} = \frac{dy}{dt} = v_z$$

$$v_x' = v_x - v$$

$$v_y' = v_y$$

$$v_z' = v_z$$

Velocity transformation equation

$$a_x' = \frac{dv_x'}{dt'} = \frac{d}{dt}(v_x - v) = \frac{dv_x}{dt} = a_x$$

$$a_y' = \frac{dv_y'}{dt'} = \frac{dv_y}{dt} = a_y$$

$$a_z' = \frac{dv_z'}{dt'} = a_z$$

$S \Rightarrow F = ma$

$S' = F' = F,\ m' = m,\ a' = a$

$F' = m'a'$

Newtons second law of motion is invariant.