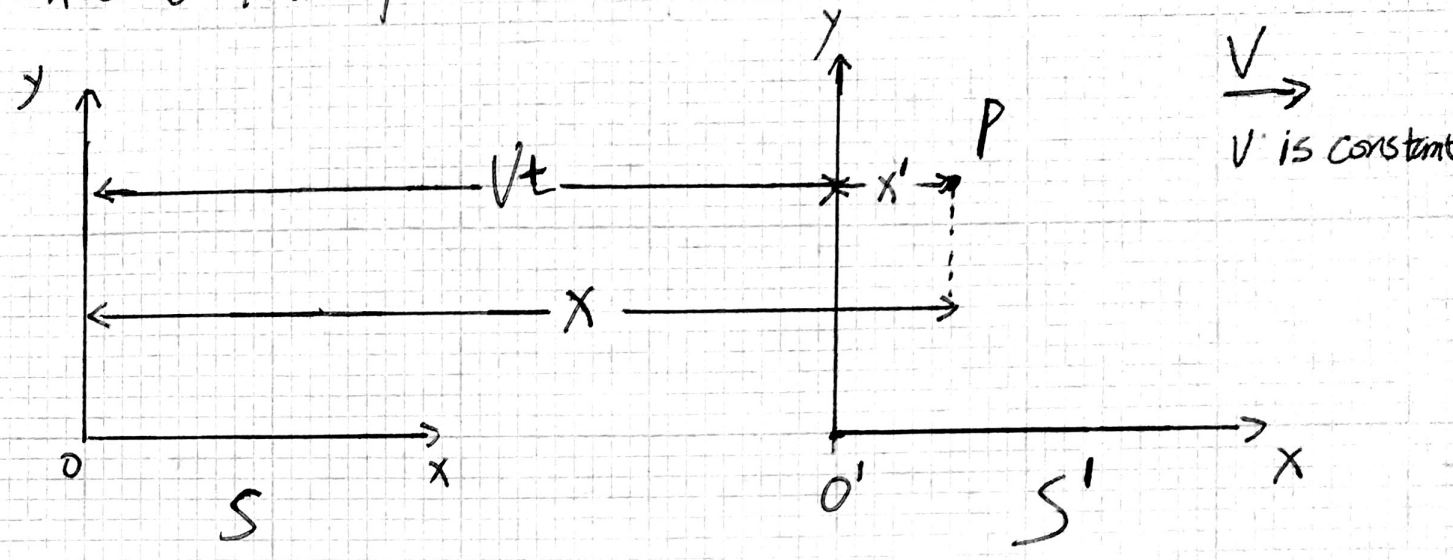
# Galilean and Lorentz Transformation.

## 1. Galilean Transformation.




★ Assumption $t = t'$ (time is absolute)

$$\Rightarrow \begin{aligned} x &= x' + Vt \\ y &= y' \\ z &= z' \end{aligned} \qquad \text{or} \qquad \begin{aligned} x' &= x - Vt \\ y' &= y \\ z' &= z \end{aligned} \qquad \text{[Galilean]}$$

Suppose P represent a practicle that is moving.

Let the components of its velocity vector in S' $(u_x', u_y', u_z')$

$$u_x = \frac{dx}{dt} = \frac{d}{dt}(x' + Vt) = \frac{dx'}{dt'} + V \qquad \text{since } dt = dt'$$

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

$$\Rightarrow \begin{aligned} u_x &= u_x' + V \\ u_y &= u_y' \\ u_z &= u_z' \end{aligned}$$

[Galilean velocity transformation equation]