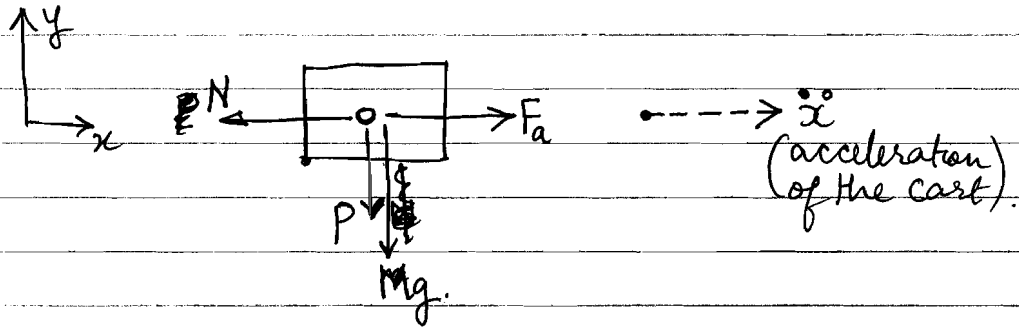
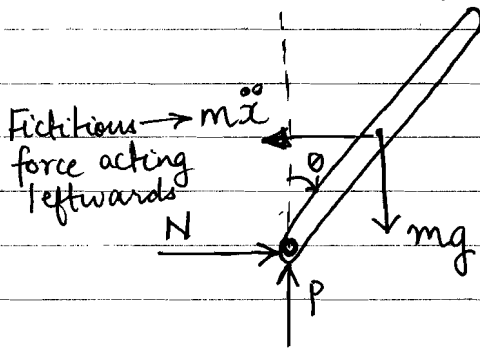


- Now, we have the following free body diagram the cart and pendulum.

(a) Cart: Motion of the cart is described standing on ground.

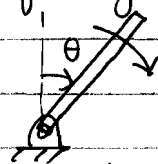


(b) Pendulum: Motion of pendulum described in the frame of the cart



$P, N \rightarrow$ reaction forces from the joint ~~between~~ attaching pendulum to the cart.

The motion of the pendulum in this frame is that of a hinged rod falling under gravity.



- Now, apply Newton's laws and get the required equations.