

Problem 1)

a)
$$D = 4N\sqrt{(p/4)^2 + A^2} = \sqrt{(Np)^2 + (4NA)^2} = \sqrt{L^2 + (4NA)^2} = L\sqrt{1 + (4NA/L)^2}.$$

b) With N kept constant, when $A \rightarrow 0$, the above formula indicates that $D \rightarrow L$.

c) With NA kept constant, when $A \rightarrow 0$ while $N \rightarrow \infty$, the distance D remains constant, as given by the expression obtained in part (a). The value of D is thus seen to be independent of the specific choices of A and N ; it is only a function of L and of the product NA , and it is always greater than L . If NA happens to be much greater than L , then $D \cong 4NA \gg L$, despite the fact that the drunkard keeps very close to the straight line and always moves forward.
