KINEMATICS

1) find angle b/w $\vec{A} = \hat{i} + \hat{j} + \hat{k}$ & $\vec{B} = -2\hat{i} - 2\hat{j} - 2\hat{k}$

2). Rain is falling vertically with speed of 30 ms^{-1}. A woman rides a cycle with speed of 10 ms^{-1}. in north to south direction. What is direction in which she should hold her umbrella?

3) The ceiling of a long hall is 25m high. What is maximum horizontal distance that ball thrown with speed of 40 ms^{-1} can go without hitting ceiling of wall?

or

Two tall buildings are 200m apart. With what speed a ball must be thrown horizontally from window 540m above ground in one building so that it will enter a window 50m above ground in other?

4). If $|\vec{A} + \vec{B}| = |\vec{A} - \vec{B}|$, find angle b/w $\vec{A}$ & $\vec{B}$

or

Unit vectors $\hat{A}$ & $\hat{B}$ are inclined at angle θ, prove that $|\hat{A} - \hat{B}| = 2 \sin \dfrac{\theta}{2}$

5). A particle moves in $x-y$ plane according to equation
$$x = 4t^2 + 5t$$
$$6y = 5t.$$ The acceleration of parti-

cle must be,

a) $14\,ms^{-2}$ b) $12\,ms^{-2}$ c) $8\,ms^2$ d) None.

(solve properly , only choosing an option will fetch zero mark).

6). Acceleration of particle is given as,
$a = (2t+1)\,ms^{-2}$,
particle is at rest at origin initially. What is distance covered after 6 seconds & velocity of body after 6 seconds.