A 2 m ladder leans against a vertical wall. If the top of the ladder begins to slide down the wall at the rate 25 cm/sec., then the rate (in cm/sec.) at which the bottom of the ladder slides away from the wall on the horizontal ground when the top of the ladder is 1 m above the ground is:

(a) $25\sqrt{3}$

(c) $\dfrac{25}{3}$

(b) $\dfrac{25}{\sqrt{3}}$

(d) 25

(b) According to the question,

$\dfrac{dy}{dt} = -25$ at $y = 1$

By Pythagoras theorem, $x^2 + y^2 = 4$ ...(i)

When $y = 1 \Rightarrow x = \sqrt{3}$

Diff. equation (i) w. r. t. t,

$2x\dfrac{dx}{dt} + 2y\dfrac{dy}{dt} = 0$

$\Rightarrow x\dfrac{dx}{dt} + y\dfrac{dy}{dt} = 0$

$\Rightarrow \sqrt{3}\dfrac{dx}{dt} + (-25) = 0$

$\Rightarrow \dfrac{dx}{dt} = \dfrac{25}{\sqrt{3}}$ cm/s