Velocity in Two Dimensions

A ball is rolling on a horizontal surface at 5 m/s. It then rolls up a ramp at a 25 degree angle. After 0.5 seconds, the ball has slowed to 3 m/s.

What is the magnitude of the change in velocity?

A) 0 m/s B) 2 m/s C) 2.6 m/s D) 3 m/s E) 5 m/s

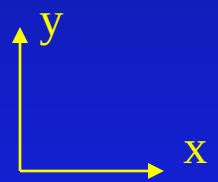
x-direction

$v_{ix} = 5$ m/s

$v_{fx} = 3$ m/s $\cos(25)$

$\Delta v_x = 3\cos(25) - 5 = -2.28$ m/s

y-direction



$v_{iy} = 0$ m/s

$v_{fy} = 3$ m/s $\sin(25)$

$\Delta v_y = 3\sin(25) = +1.27$ m/s

$$|\Delta v| = \sqrt{\Delta v_x^2 + \Delta v_y^2} = 2.6 \text{ m/s}$$