

Answer on Question#49421 - Physics - Mechanics - Kinematics - Dynamics

A body with mass $m = 5 \text{ kg}$ is acted upon by a force $\mathbf{F} = (-3\mathbf{i} + 4\mathbf{j}) \text{ N}$. If its initial velocity at $t = 0$ is $\mathbf{v} = (6\mathbf{i} - 12\mathbf{j}) \frac{\text{m}}{\text{s}}$, the time at which it will just have a velocity along the y-axis is

- (1) never
- (2) 10 sec
- (3) 2 sec
- (4) 15 sec

Solution:

Let's consider the motion of the body along the x-axis. X-component of the force $F_x = -3 \text{ N}$ provides the body with acceleration $a_x = \frac{F_x}{m} = -0.6 \frac{\text{m}}{\text{s}^2}$. To find the t at which the body moves with zero speed along the x-axis we'll use the following equation

$$v_x^f = v_x + a_x t$$

where v_x^f is the final velocity, v_x is the initial velocity, a_x is the acceleration, and t is the time. Substituting $v_x^f = 0$ and $v_x = 6 \frac{\text{m}}{\text{s}}$ into this equation we obtain

$$0 = 6 - 0.6t \Rightarrow t = 10 \text{ s}$$

So, the correct answer is (2).

Answer: (2).