

**Mathematics Questions by Topics**

Motion and Force

Question 4

Source: K21SM2Q15

**Question 4**

A particle of mass 2 kg, is moving so that its velocity vector at a time  $t$ , given by

$$\dot{\mathbf{r}}(t) = 4\sin^2(t)\mathbf{i} + 4\cos^2(t)\mathbf{j}, \text{ for } t \geq 0, \text{ given that } \mathbf{r}\left(\frac{\pi}{4}\right) = \frac{\pi}{2}(\mathbf{i} + \mathbf{j})$$

The change in momentum over  $\frac{\pi}{6} \leq t \leq \frac{\pi}{4}$ , is given by

- A.  $-2\mathbf{i} + 2\mathbf{j}$ .
- B.  $2\mathbf{i} - 2\mathbf{j}$ .
- C.  $\mathbf{i} - \mathbf{j}$
- D.  $-\mathbf{i} + \mathbf{j}$
- E.  $2\sqrt{2}$