

Name:

Sec.# (8) ---Quiz (3), Ch# 3 & 4

S.N:

ID# :

KEY

Phys 101 (Term 032)-(F. Enaya)

Show your steps clearly for full credit.

Q.1 Find the angle between the two vectors $\mathbf{A} = 2\mathbf{j} + 4\mathbf{k}$ and $\mathbf{B} = 4\mathbf{j} - 2\mathbf{k}$.

$$\vec{A} \cdot \vec{B} = AB \cos \theta$$

$$(2\mathbf{i} + 4\mathbf{j}) \cdot (4\mathbf{i} - 2\mathbf{j}) = \sqrt{2^2 + 4^2} \times \sqrt{4^2 + (-2)^2} \times \cos \theta$$

$$8 - 8 = \sqrt{20} \times \sqrt{20} \times \cos \theta$$

$$0 = 20 \cos \theta \Rightarrow \cos \theta = 0 \Rightarrow \theta = 90^\circ$$

Q.2 At $t=0$, a particle moving in the xy plane with a constant acceleration of $\mathbf{a} = (2\mathbf{j} + 4\mathbf{k}) \text{ m/s}^2$ has a velocity $\mathbf{V}_0 = (-4\mathbf{k}) \text{ m/s}$ at the origin. Find the speed of the particle at $t=3 \text{ s}$.

$$\mathbf{V} = \mathbf{V}_0 + \mathbf{a}t$$

$$\mathbf{V} = (-4\mathbf{j}) + (2\mathbf{i} + 4\mathbf{j})(3) = 6\mathbf{i} + 8\mathbf{j}$$

$\mathbf{V} = 6\mathbf{i} + 8\mathbf{j}$, this is the final velocity.

To find the speed take the magnitude :

$$|\mathbf{V}| = \left| \sqrt{6^2 + 8^2} \right| = 10 \text{ m/s}$$