

- (a) Consider the three vectors $\mathbf{a} = \mathbf{i} - 2\mathbf{j} + \mathbf{k}$, $\mathbf{b} = 2\mathbf{i} + 4\mathbf{k}$ and $\mathbf{c} = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$.
- Find the sum $\mathbf{a} + \mathbf{b}$, the scalar product $\mathbf{a} \cdot \mathbf{b}$ and the vector product $\mathbf{a} \times \mathbf{b}$.
 - Are the three vectors \mathbf{a} , \mathbf{b} and \mathbf{c} co-planar? Explain your reasoning.
- (b) The velocity of a particle at time t is $\mathbf{v}(t) = \sin t\mathbf{i} + \cos t\mathbf{j} - 9.8t\mathbf{k}$.
- What is the particle's (vector) acceleration, $\mathbf{a}(t) = \frac{d\mathbf{v}}{dt}$ as a function of time?
 - Given that at $t = 0$ the particle is at $(1, 0, 0)$, find its position at time t .