

Answer on Question #72861 Physics / Other

Given that $\mathbf{A} = 2t\mathbf{i} + 3\mathbf{j}$ and $\mathbf{B} = x\mathbf{t}\mathbf{i} - yt^2\mathbf{k}$. Evaluate, $d(\mathbf{A} \times \mathbf{B})/dt$.

Solution:

Since the vector product of the orts are given by

$$\mathbf{i} \times \mathbf{i} = \mathbf{0}, \quad \mathbf{i} \times \mathbf{k} = -\mathbf{j}, \quad \mathbf{j} \times \mathbf{i} = -\mathbf{k}, \quad \mathbf{j} \times \mathbf{k} = \mathbf{i}$$

so

$$\mathbf{A} \times \mathbf{B} = (2t\mathbf{i} + 3\mathbf{j}) \times (x\mathbf{t}\mathbf{i} - yt^2\mathbf{k}) = -3yt^2\mathbf{i} + 2yt^3\mathbf{j} - 3xt\mathbf{k}$$

Thus

$$\frac{d(\mathbf{A} \times \mathbf{B})}{dt} = -6yt\mathbf{i} + 6yt^2\mathbf{j} - 3x\mathbf{k}$$

Answer: $-6yt\mathbf{i} + 6yt^2\mathbf{j} - 3x\mathbf{k}$

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