Answer on Question #45561, Physics, Electromagnetism

if a charged particle goes unaccelerated in a region containing electric and magnetic field, a)E must be perpendicular to B b)velocity must be perpendicular to E c)velocity must be perpendicular to B d)E must be equal to vB explain?

Solution

Correct answers are c)velocity must be perpendicular to B and d)E must be equal to vB. Explanation: Lorenz force is computed as

$$\mathbf{F} = q\left(\mathbf{E} + \mathbf{v} \times \mathbf{B}\right)$$

So, if particle is accelerated we must have

$$qE = qvB$$

and

$$\mathbf{v} \times \mathbf{B} = -vB$$

First is possible when d is true and second is possible when d is true.