Answer on Question 51523, Physics, Electromagnetism

Question:

A proton with speed v perpendicular to a magnetic field B is experiences a force F. If the speed of the proton is doubled, the new force is

a) $F/2$

b) F

c) $2F$

d) $4F$

Solution:

The force that act on the proton when it moves with speed v perpendicular to a magnetic field B looks like:

$$F = qv \times B,$$

where F is the force that act on the proton, q is the charge of the proton, v is the proton speed and B is the magnetic field.

Then, from the condition of the question we know that the speed of the proton is doubled, so it will be $2v$. Taking into account, that q and B is constant we get that the force is proportional to the speed of the proton:

$$2F = 2v$$

Answer:

c) $2F$