

Answer on Question #45764 – Physics – Electromagnetism

A proton with speed v perpendicular to a magnetic field B 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 initial magnetic force is (v_1 – speed, q – charge, B – magnetic induction)

$$F = F_1 = Bv_1q \quad (1)$$

The final magnetic force is

$$F_2 = Bv_2q$$

speed of the proton is doubled:

$$F_2 = Bv_2q = 2Bv_1q \quad (2)$$

(2) \div (1):

$$\frac{F_2}{F_1} = \frac{2Bv_1q}{Bv_1q} = 2$$

$$F_2 = 2F_1 = 2F$$

Answer: c. $2F$.