

### 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:

$$v_2 = 2 \cdot v_1$$
$$F_2 = Bv_2q = 2Bv_1q \quad (2)$$

(2)  $\div$  (1):

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

$$F_2 = 2F_1 = 2F$$

**Answer:** c.  $2F$ .