

### Example 1

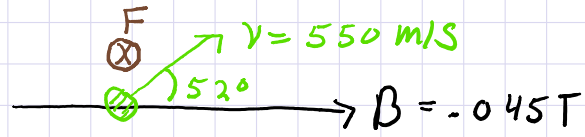
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**EXAMPLE 1**

1) An alpha particle travels at a velocity  $v$  of magnitude  $550 \text{ m/s}$  through a uniform magnetic field  $B$  of magnitude  $0.045 \text{ T}$ . The angle between  $v$  and  $B$  is  $52^\circ$ . What are the magnitudes of:

- The force  $F_B$  acting on the particle due to  $B$
- The acceleration of the particle.
- Does the speed of the particle increase, decrease or remain the same?

(An alpha particle has a charge of  $+3.2 \times 10^{-19} \text{ C}$  and a mass of  $6.6 \times 10^{-27} \text{ kg}$ .)



$$a) F = qvB \sin \phi$$

$$F = (3.2 \times 10^{-19} \text{ C}) (550 \text{ m/s}) (0.045 \text{ T}) \sin (52^\circ)$$

$$F = 6.24 \times 10^{-18} \text{ N}$$

$$b) a = \frac{F}{m}$$
$$a = \frac{6.24 \times 10^{-18} \text{ N}}{6.6 \times 10^{-27} \text{ kg}} \text{ kg m/s}^2$$
$$a = 9.45 \times 10^8 \text{ m/s}^2$$

