

### Answer on Question #75000, Physics / Electromagnetism

**Question.** A charged particle enters a uniform magnetic field with velocity vector at an angle of  $45^\circ$  with the magnetic field. The pitch of the helical path followed by the particle is  $p$ . The radius of the helix will be (1)  $p/\sqrt{2}\pi$ ; (2)  $\sqrt{2}\pi$ ; (3)  $p/2\pi$ ; (4)  $\sqrt{2p}/\pi$ .

**Solution.**

According to the second Newton's law

$$F = ma$$

So,

$$qvB \sin \alpha = m \frac{(v \sin \alpha)^2}{R} \rightarrow R = \frac{mv \sin 45^\circ}{qB} = \frac{mv}{\sqrt{2}qB}$$

The pitch of the helical path

$$p = v \cos \alpha \cdot T = v \cos \alpha \cdot \frac{2\pi R}{v \sin \alpha} = \cos 45^\circ \cdot \frac{2\pi R}{\sin 45^\circ} = 2\pi R \rightarrow$$

$$R = \frac{p}{2\pi}$$

**Answer.** (3)  $R = p/2\pi$

Answer provided by <https://www.AssignmentExpert.com>