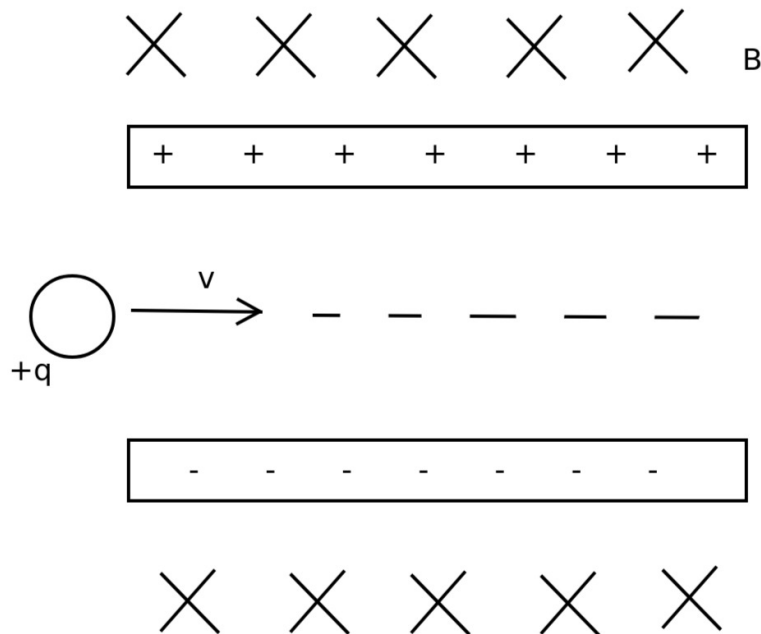


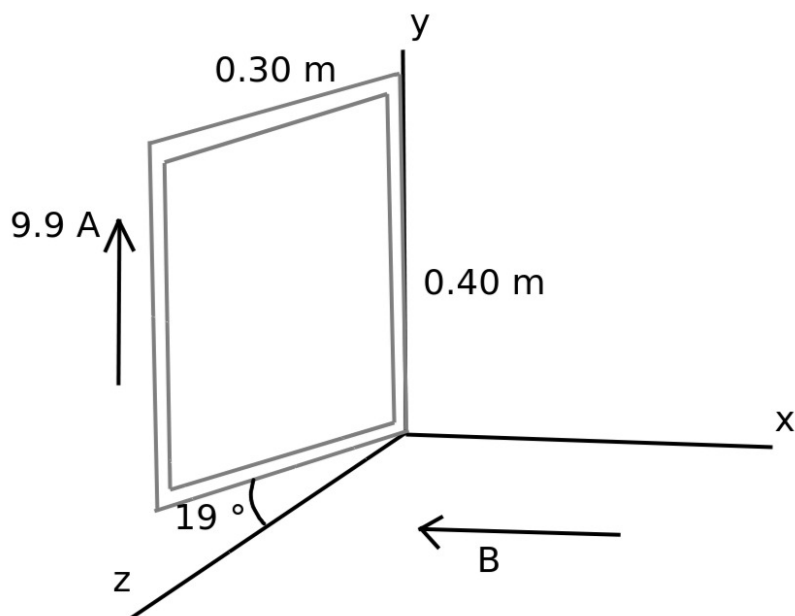
PHYS1120
Summer 2025

Show all work for credit!
Due Date: 1 August

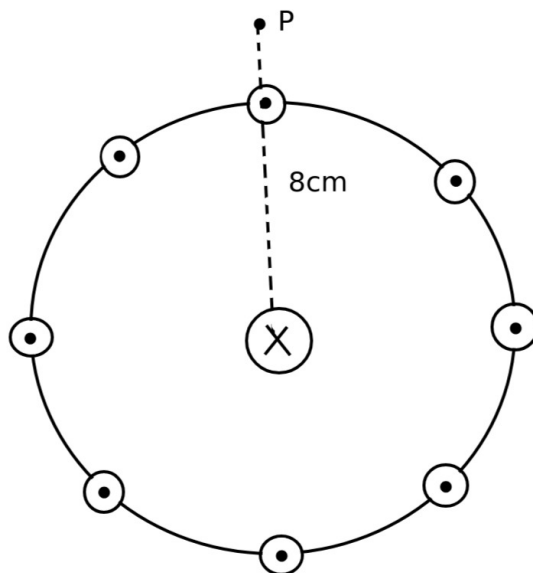
- Alpha particles (charge = $+2e$, mass = 6.68×10^{-27} kg) are accelerated in a cyclotron to move with orbital radius $r = 0.80$ m. The magnetic field in the cyclotron is 0.5 T. Find the centripetal acceleration.
- A beam of charged particles are directed along the axis shown in the figure below. If the plates are separated by 2 mm, and the magnetic field is 0.1 T, find the voltage required to allow particles moving at 5×10^5 m s⁻¹ to move undeflected.



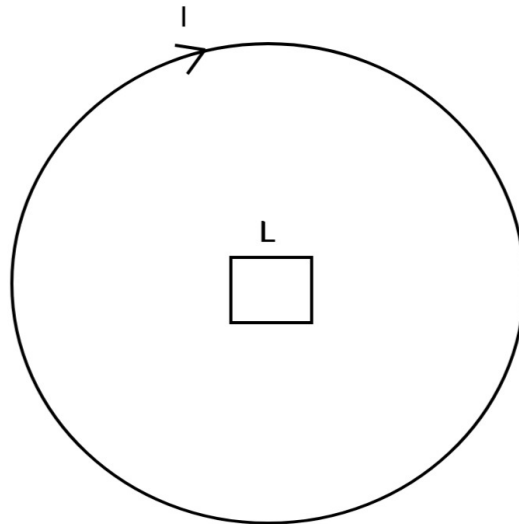
- A rigid rectangular loop, measuring 0.30 m \times 0.40 m, carries 9.9 A of current. An external magnetic field of 1.80 T is directed in the $-x$ direction. If the base of the loop (on the xz plane) makes an angle of 19° with the $+z$ axis, find:
 - The magnetic force on the top segment of the loop.
 - The magnetic torque on the loop of wire.



4. A coaxial cable carries 3 A of current into the page and 5 A of current out of the page. At a point 8 cm above this wire, find the magnetic field (magnitude and direction) produced by these currents.



5. A cylindrical loop of wire with 227 turns and radius $r = 0.67\text{ m}$ carries 54.0 A of current. A small square loop of 27 turns and length $= 1\text{ cm}$ is placed in the center of the large loop. If the current in the large loop drops to 0 A in 0.047 sec , find the induced \mathcal{E} in the square loop.



Answer key: (1) $4.59 \times 10^{14} \text{ m s}^{-1}$; (2) 100 V ; (3a) 5.35 N ; (3b) $2.02 \text{ N} \cdot \text{m}$; (4) $5 \times 10^{-6} \text{ T @ } 180^\circ$; (5) $6.60 \times 10^{-4} \text{ V}$

How many hours (approximately) did it take you to complete this assignment?