

QUESTIONS TO HAND IN – EXPERIMENT 11

NAME _____

LAB INSTRUCTOR _____ LAB DAY/TIME _____

1. Write $F = ma$ and equate with $F = evB$ (the magnetic force) and $a = \frac{v^2}{r}$ (the centripetal acceleration) to describe the motion of the electron in a magnetic field B . Solve for the velocity v in terms of the other parameters.
2. What do the quantities: m , e , v , and r refer to in the above equation?
3. An electron is accelerated through a potential difference of $V = 50$ volts. How much kinetic energy K does it gain?
4. What is the electron speed v for Question 3 above?
5. The electron is accelerated by a potential difference V (the plate voltage) as it travels from the cathode to the plate. In this process the electrostatic potential energy is converted into the kinetic energy of the electron.

$$eV = \frac{1}{2}mv^2$$

Use the above result to solve for v (the electron velocity) and substitute in the result found in Question 1. Solve for e/m (the charge-to-mass ratio) in terms of the plate voltage V , the electron orbital radius r , and the other constants.