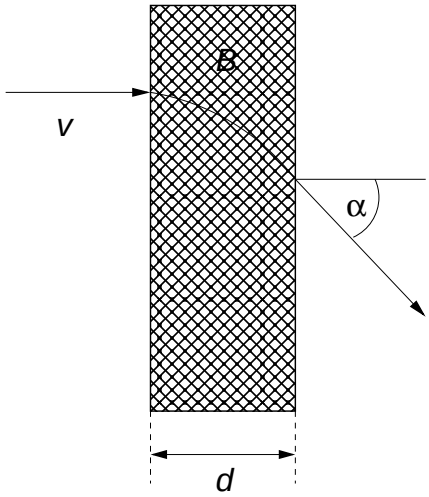
# Electricity Exam

Name: Group:
Number of points:

---

1. **Problem** 20 points
An electron is passing through a rectangular area where uniform magnetic field of $B = 1T$ perpendicular to the plane of the paper is present. The width of the rectangle is $d = 5mm$ and the velocity, mass and charge of the electron is $v = 10^7 m/s$, $m = 9.1 \times 10^{-31} kg$ and $q = -1.6 \times 10^{-19} C$.

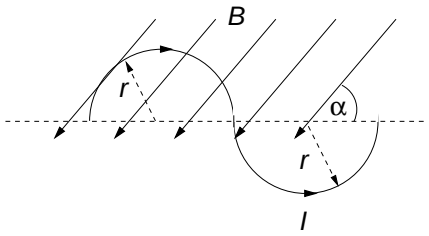



**a.)** Give the direction of the electron beam leaving the rectangular area!

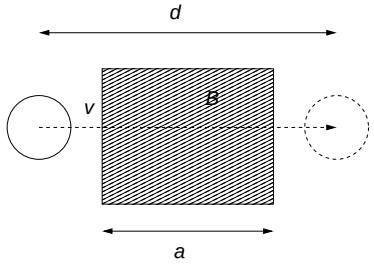
**b.)** How large is the speed of the electron leaving the rectangle?

2. **Problem** 20 points
A wire is carrying a current of $I = 10A$ in the presence of uniform magnetic field as it is shown in the figure. Find the force on the wire!

$r = 0.25m$
$\alpha = 60^\circ$

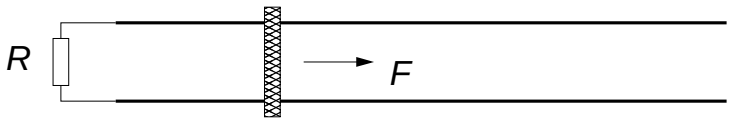



3. **Problem** 20 points
A circular wire frame is moving through a rectangular area where uniform magnetic field perpendicular to the plane of the paper is present. How much charge passed through a crossection of the wire during the motion? $a = 0.3m$, $d = 0.6m$, $r = 0.1m$, $v = 10m/s$



4. **Problem** 20 points

A small metal rod in the figure below can slide on a rail without friction. There is a uniform magnetic filed of $B = 1T$ perpendicular to the plane of the rail is present. The distance between the tracks is $d = 0.1m$ and the resistance of the resistor is $R = 0.1\Omega$. Find the maximal speed of the rod if a constant force of $F = 5N$ is acting on it!




5. **Problem** 20 points

The network given in the figure below is connected to a A.C. power supply. The frequency and the amplitude of the voltage of the power supply are $f = 400Hz$ and $V = 100V$, respectively. The amplitude of the voltage on the resistor is also $V_R = 100V$. The current through the system is $I = 1A$.

**a.)** Find the impedance of the system!

**a.)** How much power is dissipated on the system?

**a.)** Give the resistance of the resistor!

**a.)** Give the voltage on the capacitor and on the coil if the capacitance of the capacitor is $C = 1.6\mu F$!