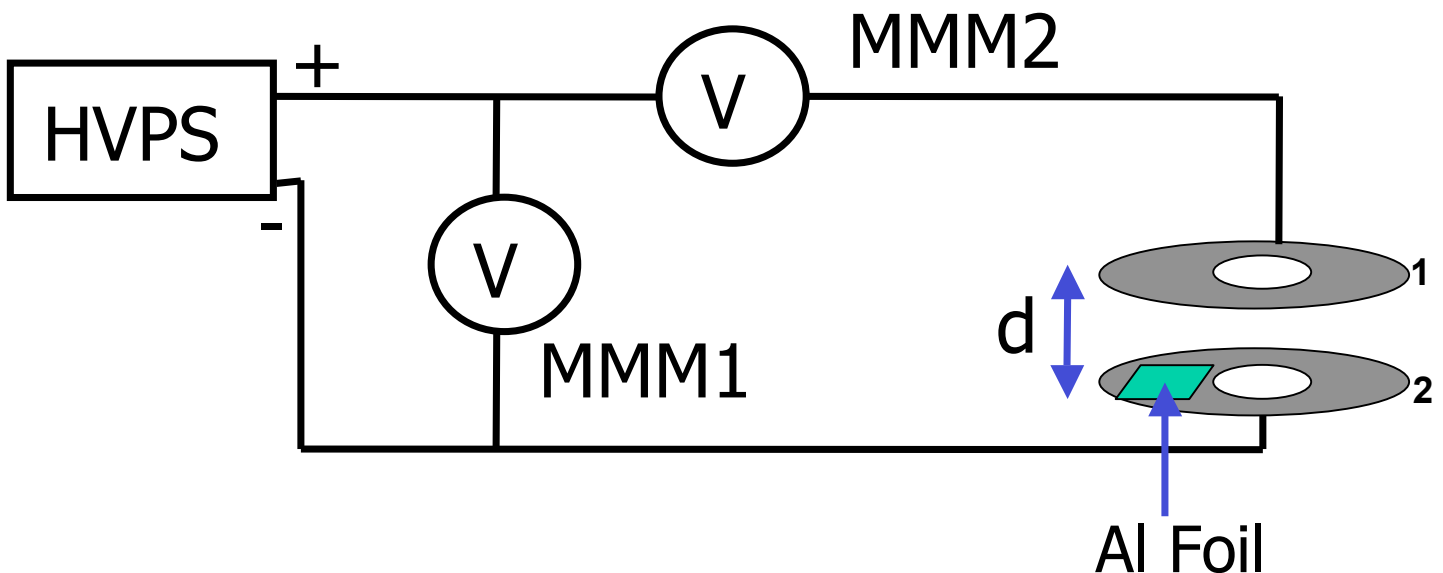


Problem 3 (30 points)

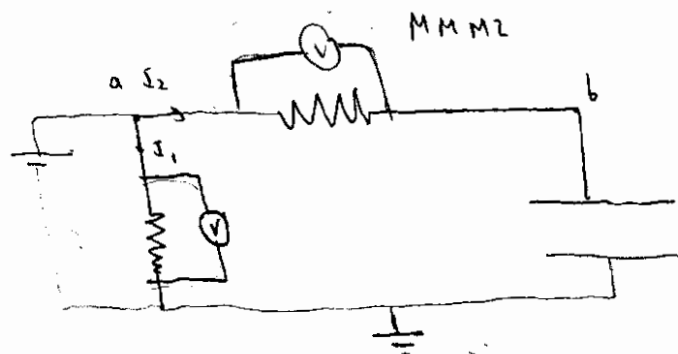
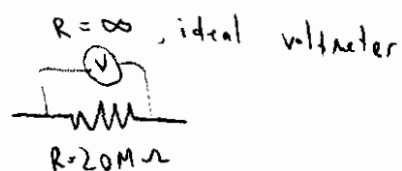
Shown below is the schematic setup of the EF experiment, including the HVPS and the two multimeters. The multimeters have a resistance of $20\text{M}\Omega$. Suppose MMM1 measures 400V just before the foil jumps. We define the negative terminal of the HVPS to be at a potential of 0V .

- (a) What is the potential of washer 1 before the foil jumps and connects the two washers?
- (b) What is the reading of MMM2 before the foil jumps?
- (c) After the foil jumps, the reading of MMM1 drops to 380V . What is the potential of washer 1 now?
- (d) What is the reading of MMM2, after the foil has jumped?
- (e) Explain why the reading of MMM1 dropped after the foil jumped.
- (f) Assume the experiment was repeated with the distance between the washers doubled to $2*d$. At which reading of MMM1 would the foil jump in this case? Explain your answer.



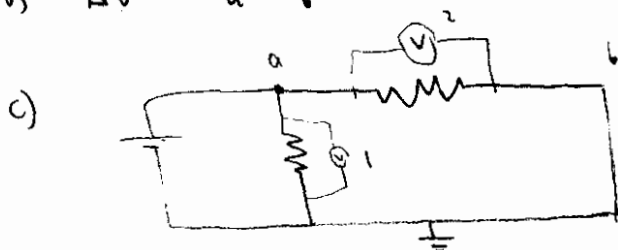
3.

I will draw the multimeters as :

Ground. Shows any choice of $V = 0$ before : $I_2 = 0$ (circuit is open) , $V_a = V_b$

a) $V = 400V$

b) $\Delta V = V_a - V_b = 0$



$V_b = 0$

d) $\Delta V = V_a - V_b = 380V$

e) The HVPS produces more current so there is a higher potential drop caused by the internal resistance of the HVPS

f) $V = E \cdot d = \frac{F}{m} d$

$$\left. \begin{array}{l} F \rightarrow F \\ m \rightarrow m \\ d \rightarrow 2d \end{array} \right\} V \rightarrow 2V$$

MMM1 would read 800V