

# FORMAL HOMEWORK EXERCISE

## *Electricity & Electronics*

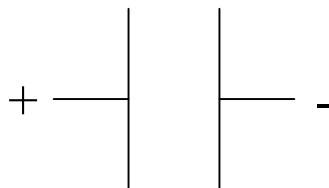
### Homework - Electric Fields & Internal Resistance

1. Draw the electric field around the following charges. You must show the direction of the field clearly.

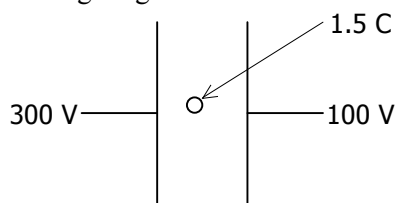
(a)



(b)



2. Look at the following diagram.



(a) What is the potential difference between the two plates?

(b) Calculate the work done in moving the charged particle across the electric field.

3. Most vehicle assembly lines use robots to paint the vehicles being produced (as shown in the photograph to the right). Electrostatic methods of painting are used to reduce wasted paint, to ensure an even covering of the car body, and to prevent mess. The car body is given a positive charge, and the paint droplets are given a negative charge as they leave the nozzle.

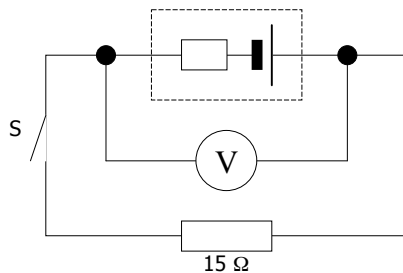


In the electrostatic painting system shown, a small droplet of paint (mass 1g) is given a charge of 2 mC before being accelerated by a potential difference of 100 V. Calculate the speed of the drop as it hits the vehicle. You can ignore the effects of air resistance for the purposes of this calculation.

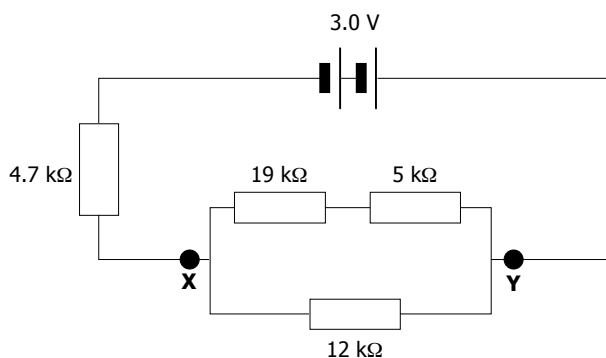
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4. In the circuit below, the reading on the voltmeter is 5 V when switch S is open and 3 V when it is closed.



- (a) What is the EMF of the cell?  
(b) Calculate the current flowing in the circuit when the switch is closed.  
(c) What is the internal resistance of the cell?
5. Calculate the equivalent resistance between X and Y in the circuit below.



***Hand in your homework by Thursday 28<sup>th</sup> October (1<sup>st</sup> week back after holidays).***