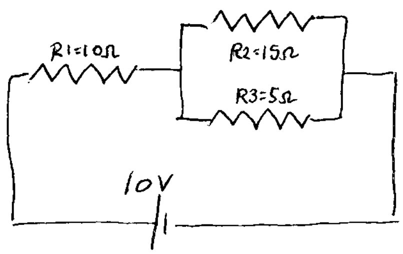
NAME:

Solution

Quiz #5: Phys142

1. [3pts] Find the resulting current through R1 in the following circuit:



current through R1 is current through battery

find R_{eq}:

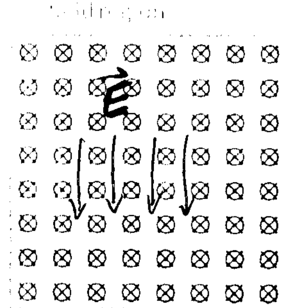
$$R_{\parallel} = \frac{R2\ R3}{R2+R3} = \frac{(15\Omega)(5\Omega)}{20\Omega} = 3.75\Omega$$

$$I_1 = I = \frac{V_{bat}}{R_{eq}} = \frac{V_{bat}}{R1+R_{\parallel}} = \frac{10V}{10\Omega+3.75\Omega} = 0.73\text{ A}$$

2. An electron with a kinetic energy of 750 eV is fired into a region of uniform magnetic field which is restricted to the square region shown below. The magnetic field points into the page, and the electron is initially traveling directly to the right as depicted in the diagram. A uniform electric field is applied such that the magnetic force on the electron is counteracted by the electric force. The electron continues to travel in a straight line even in the region of uniform magnetic field.

a) [pts] Draw the required direction of the electric field on the diagram below

b) [pts] What is the magnitude of the electric field required? [Note that 1 eV = 1.9×10^{-19} J]



Magnitudes of Electric force and magnetic force are equal.

$$qE = qvB$$

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

$$\Rightarrow v = \sqrt{\frac{2K}{m}}$$

$$\Rightarrow E = B\sqrt{\frac{2K}{m}}$$