

A Nichrome wire 88 cm long and 0.25 mm in diameter is connected to a 1.5 volt flashlight battery. What is the electric field inside the wire?

V/m

The Nichrome wire is replaced by a wire of the same length and diameter, and same mobile electron density but with electron mobility 4 times as large as that of Nichrome. Now what is the electric field inside the wire?

V/m

The electron current in the first circuit (Nichrome) is  $i_1$ . The electron current in the second circuit (wire with higher mobility) is  $i_2$ . Which of the following statements is true?

- ☒  $i_2 > i_1$
- ☐  $i_2 = i_1$
- ☐ Not enough information is given to compare the two currents.
- ☐  $i_2 < i_1$



## Part One

$$E = \frac{\text{emf}}{L}$$
$$= 1.705 \text{ V/m}$$

## Part Two

Same as part one

## Part Three

$$I_1 = n A N_1 E_1$$

$$I_2 = n A N_2 E_2$$

$$n A = \frac{I_1}{N_1 E_1}$$

$$n A = \frac{I_2}{N_2 E_2}$$

$$\frac{I_1}{N_1 E_1} = \frac{I_2}{N_2 E_2}$$

$$N_2 E_2 I_1 = I_2 N_1 E_1$$

$$N_2 = 4 N_1$$

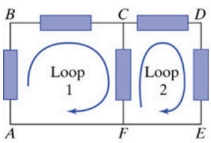
$$E_1 = E_2$$

$$4 \cancel{N_1} \cancel{E_2} I_1 = I_2 \cancel{N_1} \cancel{E_1}$$

$$4 I_1 = I_2$$

(a) In the figure, suppose  $V_C - V_F = 2$  volts, and  $V_D - V_E = 8.5$  volts. What is the potential difference  $V_C - V_D$ ?

V



(b) If the element between C and D is a battery, is the + end of the battery at C or at D?

- ☐ + end is at C  
☐ + end is at D

$$-(V_C - V_F) + (V_C - V_D) + (V_D - V_E) = 0$$

$$-2 + (V_C - V_D) + 8.5 = 0$$

$$(V_C - V_D) = -6.5 \text{ V}$$

+ end is at D because  $V_D$  is at a higher potential.