Full Solution

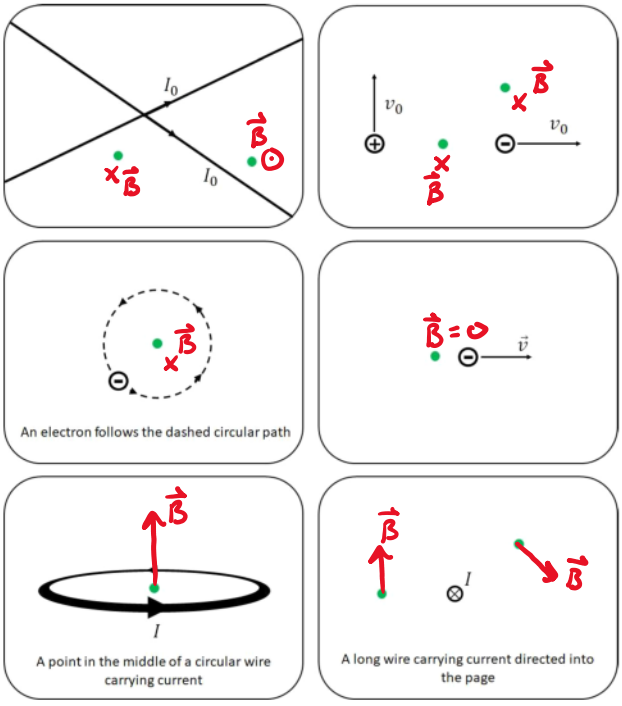
Friday, May 26, 2023 11:28 AM

Physics 203

Quizbit | Circuits and Magnetic Fields

Part A: Work individually to produce a handwritten solution to **Part A (questions 1 and 2)** of this Quizbit. Submit an image of your solution to Canvas. The quality of your solution and communication is far more important than the final answer!

1) There are six separate situations pictured. For each dot (green) in each situation, clearly indicate which direction the magnetic field will point. If the magnetic field will be zero, then clearly indicate that.

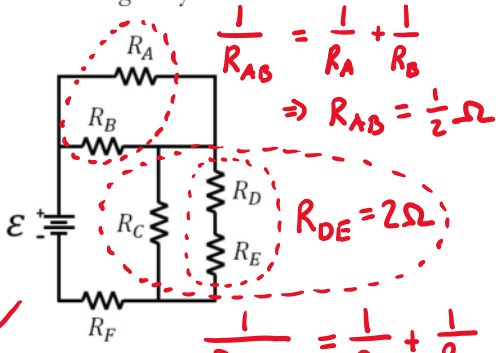


2) Which of the following quantities are scalars? (Hint: there are 4 correct answers)

a) Position $\vec{r}$
b) Displacement $\Delta\vec{r}$
c) Electric Field $\vec{E}$
✓ d) Electric Potential Energy U^E
e) Magnetic Field $\vec{B}$
f) Electric Force $\vec{F}^E$
✓ g) Resistivity ρ
✓ h) Electric Potential Field V
✓ i) Current I

Part B: As a group, assign roles to each member. One person should be the writer, one should be the recorder in charge of submitting the group solution to Gradescope (or Canvas), and if you have a third member, they should be the advice giver. Write each group member's name on the solution! Make sure to rotate roles so that each person has a chance to be the writer. **Work together to produce a written solution to Part A, then additionally answer Part B (question 3)**. Submit an image of your work to Gradescope or Canvas.

3) The pictured circuit is constructed using six identical 1 Ω resistors.
(a) Find the equivalent resistance of the circuit.
(b) The battery is a 13 V battery. Find the current flowing through resistor C.



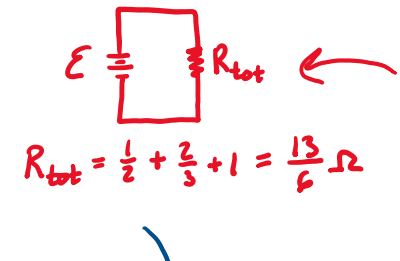
$\frac{1}{R_{AB}} = \frac{1}{R_A} + \frac{1}{R_B}$

$\Rightarrow R_{AB} = \frac{1}{2}\Omega$

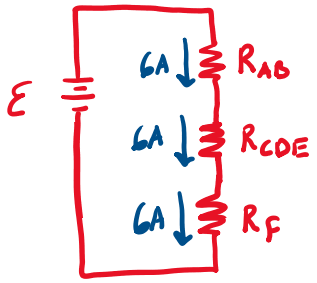
$R_{DE} = 2\Omega$

$\frac{1}{R_{CDE}} = \frac{1}{R_C} + \frac{1}{R_{DE}}$

$\Rightarrow R_{CDE} = \frac{2}{3}\Omega$



$R_{tot} = \frac{1}{2} + \frac{2}{3} + 1 = \frac{13}{6}\Omega$



$\Delta V_{tot} = I_{tot} R_{tot}$

$\Rightarrow \frac{13}{13/6} = I_{tot} = 6A$

$\Rightarrow \Delta V_{CDE} = I_{CDE} R_{CDE}$
$= (6A)(\frac{2}{3}\Omega)$
$= 4V$

$\Rightarrow \Delta V_C = 4V$

$\Delta V_C = I_C R_C$

$I_C = \frac{4V}{1\Omega} = \boxed{4A}$